UNITED STATES ARMY
AVIATION
OCT 1981

OCTOBER 1981 • VOLUME 27 • NUMBER 10

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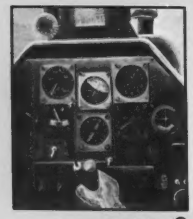

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The mission of the ***U.S. Army Aviation Digest (USPS 415-350)*** is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

The ***Digest*** is an official Department of the Army periodical published monthly under the supervision of the Commanding General, U.S. Army Aviation Center. Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center. Photos are U.S. Army unless otherwise specified. Use of the masculine pronoun is intended to include both genders unless otherwise stated. Material may be reprinted provided credit is given to the ***Digest*** and to the author, unless otherwise indicated.

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This publication has been approved by The Adjutant General, Headquarters, Department of the Army, 25 April 1980, in accordance with Army Regulation 310-1.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-5 and send directly to CDR, AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220. For any change in distribution requirements, initiate a revised DA Form 12-5.

National Guard and Army Reserve units under pinpoint distribution also should submit DA Form 12-5. Other National Guard units should submit requests through their state adjutant general.

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Helicopter AIR TO AIR Combat Operations

THE BIG PICTURE

THE ROLE OF THE helicopter in battle has grown from a few special combat service support operations in World War II to critical tank-killing missions in the intense armored warfare of the AirLand Battlefield. In the 1960s the United States, reacting to vision and tactical need, developed a large and versatile helicopter force. In the 1970s the Soviet Union, responding to its own needs and perhaps U.S. Army Aviation initiatives in Southeast Asia, fielded a large and powerful combat helicopter force. Consequently, we find ourselves confronted with a challenge to prepare for combat among helicopters, as well as helicopters and fixed wing aircraft which are included because they fly through, influence and fight in some of the same airspace as helicopters. Therefore, a number of studies and evaluations have been conducted during the last 12 years, seeking information concerning helicopter versus helicopter and helicopter versus fighter air combat.

Brief summaries of some of the tests follow:

- In 1971, the Attack Helicopter Air-to-Air Test conducted by Combat Developments Command evidenced the ability of armed helicopters with trained crews to evade

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THE BIG PICTURE

and possibly engage attacking fighters and helicopters. The military operational judgments made during the test provide useful conclusions concerning detection ranges, flight maneuvers, guns, missiles and aircraft stress. The innovative helicopter air combat tactics used during the test are well documented.

• The 1977 Air Combat Engagement (ACE) tactical development and evaluation conducted by the U.S. Army Aviation Board provided experience in helicopter versus helicopter air combat evaluation, instrumentation and tactics. The Army Materiel Systems Analysis Activity was able to collect information for future digital simulation of helicopter combat. The results in the areas of target detection and weapon systems performance revealed the importance of tactics, aircraft weapons and aircraft speed.

• In May 1978, the Army and Air Force conducted the Joint Countering of Attack Helicopters (J-CATCH) Phases I through IV, which was a very worthwhile tactics development and evaluation effort. Phase I was performed in a differential maneuvering simulator at the National Aeronautics and Space Administration Langley Research Center, VA, to develop and assess fighter tactics and weapons' performance against helicopters. Phase II evaluated Army attack helicopter team tactics and materiel against generic threat attack helicopters with capabilities similar to the Soviet Hind. Phase III evaluated Air Force A-10, A-7, F-4 and F-15 fighter operations against the generic threat helicopter. Phase IV evaluated the capability of a joint air attack team (JAAT) employing A-10s or A-7s operating in conjunction with an attack helicopter team to counter a threat helicopter force. The bottom line result of the J-CATCH test was a requirement for an Army helicopter air-to-air self-defense weapon. The test report recommended that follow-on phases V and VI of J-CATCH be conducted to evaluate Army ground and air defense forces and a total joint AirLand force against the threat helicopter forces, respectively. The J-CATCH experience has sensitized many Army, Air Force and Marine pilots, staff officers and commanders to the challenges of air combat against helicopters.

• Again, in 1979, yet another joint U.S. Army and Air Force test, known as the Tactical Aircraft Effectiveness and Survivability in Close Air Support Antiarmor Operations or TASVAL, was conducted. Test objectives included evaluating the threat combat factors that impacted most severely on friendly aircraft acting singly and synergistically as a JAAT. Analysis of the test results evidences the destructive effectiveness of aircraft weapons systems and supports the combat advantages of the JAAT.

Although initial U.S. Army testing was conducted in 1971, currently only the U.S. Marine Corps (USMC) doctrinally recognizes and trains for helicopter air combat. In fact, the USMC is currently installing the AIM 9-L, Sidewinder, air-to-air heat seeking missile on their AH-1 Cobra helicopters. However, increasingly more members of the Army Aviation and Air Force communities are coming to believe that air combat involving both individual helicopters and unit operations is inevitable. The possibility of helicopter air-to-air combat (HATAC) presents our Army Aviation community and indeed the entire armed forces with considerations that cannot be viewed in isolation. Since Army Aviation is integral to all Training and Doctrine Command mission areas, the doctrine and employment of aviation forces impact directly on some and indirectly on virtually all aspects of the battlefield. In other words, developments in HATAC doctrine and equipment must be carefully coordinated with other branches and services and will require great expertise and the expenditure of vast resources.

Why?

Generally speaking, U.S. Army Aviation faces the same threat in the air and on the ground as the rest of the combined arms team. We are, however, particularly vulnerable when airborne to the following three categories of airborne threat, listed here in order of severity:

- armed helicopters,
- ground attack aircraft, and
- high performance fighters.

Threat high performance fighters are designed for air-to-air combat with other fixed wing aircraft. They normally have an excellent high speed capability, exceptional maneuverability at normal combat speeds (medium to high subsonic and transonic speeds), high specific excess power, good-to-excellent avionics, and the ability to employ guns and a wide range of air-to-air missiles. To achieve these capabilities, their ideal maneuvering speeds are usually rather high, impacting on low speed maneuverability. Although they can fight at low altitude, they are not designed nor ideally suited to combat helicopters at very low altitude.

Threat ground attack aircraft have typically lower performance than fighters in that their maximum speed and specific excess power capabilities are less, but their low speed maneuverability is excellent.

This stems from their wing which is designed to carry heavy loads (straight, thick and of relatively high aspect ratio), high structural limit load factor, low "corner speed" (best maneuver speed), and a sufficiently high thrust-to-weight ratio to accelerate rapidly at low speeds and to work effectively in the vertical. Although fire control avionics are designed for air-to-ground operation, they can be expected to have a good capability when employed in an air-to-air mode. The ground attack aircraft gun, when employed with a good sight, is highly lethal, of large caliber, and has a long effective range (for a gun) and high rate of fire. The GAU-8, 30 mm cannon, on the U.S. Air Force A-10 close air support fighter is an example of such a system. Short range air-to-air missiles (on the order of 5 to 10 kilometers) also can be carried.

Threat armed helicopters, typified by the Hind-D, represent a potential air-to-air threat to U.S./NATO helicopters. These helicopters are heavily armed with guns, rockets and antitank guided missiles, have relatively high maximum speed and are heavily armored. It is certainly conceivable that they could also develop a capability to employ short range (5 to 10 kilometers) air-to-air missiles.

Essentially all this leads us to observe that the old adage that "the best antitank weapon is another tank" also may be true for helicopters. In other words, the best antihelicopter weapon may well be another helicopter!

Chess For High Stakes

The magnitude and complexity of the overall air defense problem can be further gleaned from the following simplistic analysis of the interaction of opposing forces on the AirLand Battlefield.

- Soviet armor is a formidable threat, so we have developed our joint air and attack helicopter teams into a significant antiarmor force. However, the Soviet air threat is also formidable and indications are that this air threat, both fixed wing and helicopter, will function to counter U.S. helicopters and close air support aircraft in the protection of Soviet armor. The development of an impressive number of both troop-carrying and armed helicopters in the Warsaw Pact inventory poses a severe threat to U.S. combined army operations and must be countered by whatever means available. Thus, there is an extremely high likelihood of air-to-air engagements between helicopter forces in close combat roles. There is also a high potential for air-to-air engagements between helicopters during second echelon attacks into threat rear areas, operations along the forward line of own troops (FLOT) and rear area combat operations.

Given these factors, our attack and scout helicopters will require an antihelicopter capability which may well become an important mission not only for their own protection but for the protection and support of other elements of the combined arms team. Failure to have this capability may result in the threat checkmating our defensive helicopter antitank capability and our offensive ground gaining armor as well.

Mission First

It is important to note that self-defense is an implicit mission of every Soldier, crew or system. For example, if an infantryman attacking an objective runs across a tank, he must perform antitank functions; an attacking aircraft would require him to perform air defense functions and so on. Ultimately self-defense is not subsequent to mission accomplishment but is required before, during and after the conduct of the assigned mission, for without the ability to survive, it would not be possible to achieve the stated objective, i.e., attack, defend, support by fire, etc. In real terms then, to field forces or systems that present an obvious vulnerability or "Achilles Heel" is to invite quick and devastating neutralization and ultimately mission failure. With the delicate balance of tasks that our combined arms team depends on, Army Aviation cannot afford to neglect the air threat in light of our mission which is to conduct primarily offensive warfare, employing instantaneous mobility, firepower and shock effect to gain decision.

The Battlefield

Associated with any military action is the all important battlefield environment. The AirLand Battlefield will be characterized by natural and manmade obscurations, confusion due to command and control difficulties and saturation of the airspace and airwaves. Consequently, in developing HATAC concepts of employment a realistic battlefield environment must be taken into consideration.

Target acquisition will be affected by weather conditions such as fog, haze and cloud cover. As a result of battlefield fire and movement, smoke and dust will be an ever-present factor to contend with. Coordination of combined arms operations, when identification of force elements and even the exact location of the FLOT is uncertain. will be inefficient at best. Command and control difficulties will be further compounded by electronic countermeasures saturating the electromagnetic spectrum. In this environment Army Aviation forces may encounter enemy aircraft during preplanned threat or friendly operations or as a result of a chance encounter. So surprise of one or both opposing forces will almost always be a critical factor (see figure on page 4).

THE BIG PICTURE

Test results to date suggest that surrogate threat enemy helicopters fighting in formations proved to be a formidable threat for all the U.S. aircraft evaluated in J-CATCH. Army Aviation forces and joint air attack teams faced with enemy helicopters operating in support of ground forces have several options, including the following:

- Fight as part of the combined arms team against the enemy ground and air forces.
- Split the U.S. forces against the enemy ground and air threats.
- Retire the U.S. helicopters from the battlefield.

As stated earlier, J-CATCH examined tactics/techniques, training, doctrine, existing weapons system effectiveness, organization and air-to-air hardware development. Specific findings indicate, however, that all of these areas could be exploited to our benefit. Specifically, hardware development of an air-to-air weapon system could offer us a near term and effective means to counter threat helicopters. In light of current enemy tactics and methods of employment, friendly helicopters in J-CATCH were continually in a look-up, shoot-up attitude when confronting the threat. Since phases V (air defense effectiveness) and VI (combined arms effectiveness) of J-CATCH have not yet been conducted, a brief 30-day concept evaluation program (CEP) addressing Stinger air-to-air missile CEP (SAMCEP) was conducted at the Army Aviation Center from September to October 1981. The SAMCEP examined Stinger air-to-air missile effectiveness against threat aircraft in a terrain cluttered NOE flight environment. Emerging data suggest excellent effectiveness of the Stinger or similar type air-to-air missile in these flight modes.

Nature Of Helicopter Air-To-Air Combat

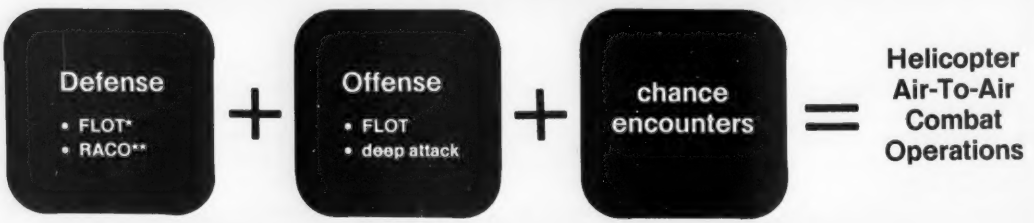
Helicopter air-to-air combat stresses aggressive concealed movement and attacking from a position of advantage at optimum standoff range. Helicopters operate at very low altitude to take full advantage of the masking provided by vegetation, manmade structure and terrain. When close-in engagements occur with other helicopters, they are more "catfights" than "dogfights." Specifically, they are lethal, brief in duration and have a small footprint. Once engaged by another helicopter, it is almost impossible to disengage—under these conditions, a good offense, with an onboard weapons system, may be our only defense.

The effects of obscuration will most heavily impact on target acquisition, detectability and the ability to fly fast and low to the ground. Command and control difficulties will confuse knowledge of the air and ground battle situation. Electromagnetic and optical interference will degrade avionics, visionics, and fire control systems, communications and missile systems. Surface-to-air defenses will force the helicopter to work close to the ground and take advantage of terrain.

HATAC Tactics

Tactics are driven by the dictum that inevitably the winner of an engagement is he who detects first, brings his weapons to bear first, fires with high lethality, then quickly egresses. Ideally HATAC should be viewed as an integral part of our overall air defense effort and capability. An aerial weapons system is in many respects a highly mobile, flexible and lethal air defense system. Operating throughout the battle area, armed helicopters

Prelude to aerial engagements



*Forward line of own troops
**Rear area combat operations

can provide the ground commander with an enhanced air defense capability in response to air attack.

Against fighters, the helicopter should attempt to prevent the fighter from employing its air-to-air missiles. For those conditions (i.e., ground clutter, short range) where the fighter's acquisition radar and associated missiles can be essentially precluded, the fighter is committed to a gun attack. This is to the helicopter's advantage since it brings the fighter into the helicopter's regime, makes it more susceptible to surface air defense fires and permits the helicopter to employ effective evasive maneuvers. Given any sort of a credible air-to-air weapon, the helicopter could in fact have a distinct advantage over the fighter—thus discouraging attack. Where standoff attack cannot be precluded, the helicopter's defense must lie in masking, low electronic or infrared and radar signatures, longer range weapons and in the use of countermeasures.

The ground attack aircraft poses a more serious threat to the helicopter because its main armament is a highly lethal gun, as well as rockets and missiles. Also, its agility at low speed and low altitude is superior to that of a high performance fighter, so it can work effectively in the vertical (air defense considerations permitting) putting the helicopter at a disadvantage. Finally, it can make very low altitude runs, which minimize the look-down and gun tracking problem. To defeat this threat, the helicopter must employ sound evasive tactics and possess good maneuverability as well as air-to-air weapons.

Tactics to be used against armed helicopters are still being developed, with the greatest progress thus far being made by the U.S. Marine Corps. However, since threat helicopters have the intrinsic capability to operate in the same regime as friendly helicopters, and will be present in large numbers, they can only be defeated through a combination of effective target acquisition systems, sound tactics, excellent maneuverability and a superior weapons/fire control system. Ultimately, the determination of "fight or flight" will and must be made by the battle captain based on the factors of mission, enemy, terrain and troops available.

As HATAC tactics, equipment, and training become more sophisticated, we must round out our aircrew training to include old-fashioned aerobatic, evasive maneuvers to prepare for the majority of engagements which are expected to occur at ranges within 700 to 1,000 meters. Training aircrews to seek a position of advantage at optimum standoff ranges through concealed movement is a vital training objective . . . NOW!

Equipment Requirements

Equipment developments must incorporate detectability/crew visibility, weapons/fire control systems, and agility/performance capability.

Good visibility requires good cockpit design, placement and sufficient pilot aids so the pilot can keep his "head out of the cockpit." To reduce detectability, electronic, infrared and radar signatures must be low, and skylining and visible motion must be minimized.

Our helicopters must be able to outrange, with high lethality weapons, all air-to-air weapons they cannot avoid or defeat. A traversable gun with a computing air-to-air capability, especially an antihelicopter capability, is essential for close combat. An air-to-air missile system would provide a long-range capability. Fire control visionics and avionics must be able to fully support these weapons and permit their rapid employment in consonance with other air defense systems.

Bottom Line

It is becoming increasingly evident that we have a threat problem to solve with little time or resources to waste. We at the Aviation Center solicit the advice and assistance of all members of the aviation community and the combined arms team in maintaining the functional air defense capability of our Air-Land forces, both in the air and on the ground. Our draft HATAC concept statement which is published in this issue, when staffed and approved, will form the foundation for our equipment acquisitions and future training programs. In the meantime I urge you to expand your individual and unit training programs and plan now to be capable of air defense self-protection missions to deny the threat an air superiority advantage over our valuable helicopter resources.

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AIR TO AIR

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the CONCEPT

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ARMY AVIATION pioneers of the 1950s, as well as their predecessors and comrades in arms in the U.S. Army Tank Corps and Air Corps, probably never doubted that they would be shot at by or would shoot at an opposing enemy weapons system. Consequently, they strapped any weapon they could acquire on any available vehicle or aircraft. When one studies military history and the growing pains associated with new ideas such as personal armor, cavalry, gunpowder, rifled guns, repeating guns, tanks and airplanes, it is not surprising that the emergence of helicopter air-to-air combat has encountered some stiff resistance. A sage military and political observer had this to say about new combat developments: **"It must be remembered that there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage, than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old institution and merely lukewarm defenders in those who would gain by the new one!"** *MACHIAVELLI "the prince" [1513]*

So it comes as no surprise that many concerns about the implications of allowing Army Aviation to be given an air combat mission have been voiced. Some of these concerns, beliefs and perceptions are listed below:

- Helicopters will be diverted from essential ground support, tank-killing missions for air combat tasks.
- Stinger missiles will be drawn from the short supplies of the ground air defense units.
- Helicopter air combat requirements are embodied in an air-to-air missile.
- Air defense units should destroy the enemy helicopters or close air support aircraft.
- Certain elements of the intelligence community are not convinced that Soviet Union helicopters pose a serious air combat threat.
- The extra weight of an air-to-air missile will unnecessarily burden helicopters.
- Scout helicopters should not be armed.
- Current aircraft weapons systems are adequate for self-defense.
- Aviators will unnecessarily seek air combat.
- The requirement for self-defense against enemy helicopters may exist, but the high cost of the MLMS (Multipurpose Lightweight Missile System) program requires a long look at how to best meet that requirement.
- Army Aviation air combat is beyond Army roles and missions and/or conflicts with Air Force roles/missions.
- Air Force air superiority systems can provide the necessary protection.

Although not all of these fears are groundless, I suspect they are representative of the universal apprehension that normally accompanies the introduction and development of most new ideas and equipment. At any rate and for my money, it would be preferable to have a less than desirable capability to do something rather than have no capability at all, especially when discussing the application of violence.

If thus far the need for a helicopter air-to-air capability doesn't readily strike you between the eyes, consider the following rationale:

In accordance with FM 100-5, "Operations": "Tanks are the primary offensive weapon in armored warfare." To counter the vast numerical superiority of Soviet ground forces in tanks, U.S. Army Aviation has developed the helicopter into an effective antitank weapon system. The Soviets, recognizing the value of our antitank helicopters, have developed their own antitank (Hind-E) and postulated antihelicopter (Hind-F) attack helicopters which, again, may soon achieve numerical superiority to our own. The end result of this military version of a chess match is that both our antitank defensive capability and our offensive ground-gaining capability will be neutralized. Obviously, we cannot allow this situation to develop further. The only possible solution to a threat of this magnitude is to counter it with every available resource. Our own aviation systems are probably going to be called upon to protect not only themselves but other elements of the combined arms team as well, which leads us to the need for helicopter air-to-air combat (HATAC) doctrine, equipment and training . . . NOW!

The following draft concept statement addresses this growing air threat to our combined arms team effectiveness:

Concept Statement

1. PURPOSE: To outline the concepts for helicopter air-to-air combat for Army Aviation. Threat forces have developed doctrine, equipment, training programs and a demonstrated capability to employ fixed wing aircraft and helicopters in an antihelicopter role, necessitating the development of this conceptual statement.

2. LIMITATIONS: None.

3. OPERATIONAL CONCEPT: U.S. Army Aviation will operate outnumbered in a hostile air threat environment. Specifically, the growing threat helicopter superiority in numbers, armament, survivability and airspeed significantly threatens our aviation, air defense, land combat, amphibious and ground support systems and rear area support complexes. Because of the ability of threat air forces to conduct all-weather extended attacks, day or night, an effective around-the-clock counterair capability is required from the theater rear up to and including the forward line of own troops (FLOT). Additionally, to realize our concept of deep attack in the Air-Land Battle, an air-to-air combat capability is required by Army Aviation elements conducting deep attacks beyond the FLOT into the threat rear area.

a. Concepts of Employment. The fundamentals of helicopter air-to-air combat differ little from existing ground or Air Force fighting techniques and include combat against fixed wing aircraft. All elements of the combined arms team must minimize threat acquisition of friendly aircraft by deceiving, evading or destroying threat aircraft. Due to the range and speed of aircraft, surprise will almost always be a factor for either friendly forces, enemy forces or both. Therefore, all friendly forces must be prepared to report contact with and counterattack faster, more numerous and heavily armed threat helicopters and fixed wing aircraft. Conflict with threat air forces will require the air battle captain in conjunction with the ground commander to plan and execute a course of action. This specific course of action will depend on the variable factors of mission, enemy, terrain and troops (METT) available. Options include, but are not limited to—

(1) Fight as part of the combined arms team to counter the enemy air force.
(2) Divide the friendly air and ground force to counter the enemy air and ground force.
(3) Mass the friendly force against the enemy air or ground force.
(4) Withdraw the friendly helicopter force.

b. Individual Aircraft.

(1) All aircraft—helicopter air-to-air combat drill supplements existing methods of target engagement. Individual aircraft employ fire and maneuver to defend against enemy aircraft during air raids, air ambushes and chance encounters. To win an engagement, crew tactics must include first detection, first lock-on, and first and accurate fire followed by timely reorientation on other targets or evasion. Helicopter air-to-air battle drill will rely primarily on armament, aircraft survivability equipment, radar warning systems, evasive maneuvers and supporting fires.

(2) Scout/Field artillery aerial observer/reconaissance. Requires armament that enables the system to be employed in conjunction with attack aircraft to perform missions of: gaining and maintaining enemy contact, surveillance, fire support and self-defense.

(3) Attack. Requires armament that enables the system to be employed offensively to counter threat ground and air forces and support our attacks into the enemy rear area. Provides protection for other friendly aircraft and ground systems and rear area support complexes.

(4) Assault/utility. Requires armament for self-defense during movement of troops, equipment and supplies throughout the battle area. Relies primarily on armed escort, supporting fires and evasive maneuvers for air defense.

(5) Medium/heavy lift. Requires minimal armament for self-defense. Relies primarily on avoiding acquisition by threat systems, armed escort and evasive maneuvers for air defense.

c. Aviation Units and Teams.

(1) All aviation and joint air attack teams must be defensively employed to minimize the air threat while offensively destroying, disrupting and delaying the ability of threat air forces to influence the battle.

(2) Air cavalry in the covering force, battle area and rear area must detect and report threat air operations, to include reconnaissance, attacks, penetrations and chance encounters, particularly where air-to-air engagements occur.

(3) Attack units must be prepared to counterattack threat air forces and conduct deep attacks to neutralize threat air forces.

(4) Combat support and combat service support units must conduct operations in the rear area, battle area, covering force and beyond the FLOT in support of maneuver forces.

4. ANNEXES

a. Doctrinal Requirements. All aviation-related how-to-fight manuals, field manuals and regulations must be updated to reflect helicopter air-to-air combat concepts. HATAC concepts should be based on joint service experience and consolidated in a new training circular.

b. Equipment Requirements. Existing equipment (armament, fire controls and target acquisition devices) must be employed to maximum advantage. In accordance with the concept-based requirements strategy, we must begin now to address weapons, aircraft, associated systems and technology advances that are required to support this concept statement. The three primary technological areas of interest are detectability/crew visibility, weapons/fire control system and agility/performance capabilities. More specifically—

- **A long-range weapon (such as an air-to-air missile) would greatly enhance air-to-air capability.**
- **A gun sight/system is needed which will permit accurate cannon fire when both the firing aircraft and target are moving.**
- **Higher flight speed and dash power are needed.**
- **Aircraft systems be improved to reduce pilot workload and allow the pilot to concentrate more visual attention outside the cockpit.**

c. Training Requirements. **Institutional, installation, individual and unit training must incorporate helicopter air-to-air combat considerations. Training aircrews to aggressively seek a position of advantage at optimum standoff ranges through concealed movement is a vital training objective.**

d. Rationalization, Standardization, Interoperability. **Developments in HATAC concepts and doctrine must be coordinated with allied forces.**

The basis for this draft concept statement is to develop doctrine to counter the air threat. Doctrine is "the fundamental principles by which military forces guide their actions in support of objectives." It is authoritative but requires judgment in application. Doctrine is usually formed from an evolutionary process that normally follows the steps of visualizing concepts, solidifying procedures and forming the approved doctrine that is used to develop the tactics that armies train to accomplish in battle. Further doctrinal development of helicopter air-to-air combat concepts will be in accordance with Training and Doctrine Command Regulation 11-7, "Operational Concepts and Army Doctrine."

In closing it seems appropriate to quote some of the guidance for doctrinal development from paragraph 3-3, page 9, TRADOC Regulation 11-7:

"(2) New concepts usually evolve from a perceived imbalance or the recognition of an advantage to be gained by the Army in fighting the land warfare battle. The need for concepts normally results from recognition of—

"(a) An assigned or potential mission that cannot be performed with existing doctrine, organizations, materiel systems, or training programs.

"(b) Existing or potential technological capabilities which, if exploited, would increase the Army's advantage on the battlefield.

"(c) New or emerging threat in the doctrine, tactics, and/or materiel developments of a hostile force which must be countered.

"(d) 'Lessons learned' from history which would enhance our ability to fight.

"(3) Since innovative ideas are the foundation of all concepts, it is especially important in the formative stages of concept development that writers not be inhibited by the 'status quo' or be unduly concerned about real-world constraints. It is important to insure the concept development process remains vital, open and receptive to revolutionary as well as evolutionary ideas.

"(4) When the need for a new operational concept is recognized, the major substantive issues will be outlined in the concept statement. This short, general statement will address what *needs* to be done in combat; *why, where* and *when.* All concept statements will be approved by the CG, TRADOC prior to developing the interim operational concept."

With these thoughts in mind, we solicit your comments and suggestions in the development of the helicopter air-to-air combat concept. Please address all correspondence to Chief, Concepts and Studies Division, Directorate of Combat Developments, U.S. Army Aviation Center, Ft. Rucker, AL 36362.

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AIR TO AIR

Illustration by Craig Randall

SMART GUYS WIN

The thinking man's guide to Helicopter Aerial Combat

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The views of the author do not purport to reflect the positions of the Department of the Army nor the Department of Defense

WE'RE PRETTY DUMB, sometimes!

Oh, sure, we've realized the importance of the air above the battlefield for a long time. We know all the maxims; we wrote many of them; we've been teaching our enemies for years, and they've learned the hard way the inestimable value of skilled, brave men and superior machines when battle is joined for control of the sky. Bad guys only win when they're smarter than the good guys. But we're still pretty dumb, sometimes.

It wouldn't be fair, though, to be too hard on ourselves. As long as men have fought, and as long as nations have warred, the first battles of one war have almost always been fought with the weapons and tactics of the war just past. (Hitler's Blitzkrieg was a notable exception, with equally notable successful results; he was successful because his adversaries were still fighting with World War I weapons and tactics.)

Axiom No. 1. **The guy who tries to fight**

MONTHLY WRITING AWARD

today's war with yesterday's weapons and tactics is going to get his butt kicked, unless everybody else is as dumb as he is.

We need to concern ourselves with getting smart. Let's take a look at the battlefield today and see how smart we can get.

The commander today must be aware of the fact that the air battle must be won if the ground battle is to be won, right? Wrong! Well, try this: He should concentrate on the ground battle and let the air battle take care of itself, right? Wrong again! The problem is, we don't have two separate battles any more. Technology has given us a lot to think about:

- Ridiculously lethal air defense weapons that have forced tactical air doctrine closer and closer to the ground.
- Impressively effective helicopter weapons systems from whose firepower virtually no target is safe (helicopters which, by the way, are able to use terrain like a ground weapon or zoom over it like an air weapon).

Seems like the message here is that what we have in the armed helicopter is a hybrid, a mutation, an offspring from the marriage of the air and ground battles. Because of the capabilities of today's flying machines, specifically armed helicopters, the commander now must think, reflect, plan and operate continuously in all three dimensions. He may elect to move his helicopters around the battlefield like flying bazookas, using the air only as a "highway" for movement. That's neat, as long as the bad guys just sit back and watch the traffic.

But the commander who uses the air merely to move things through it doesn't have everything possible going for him. The air, all the way from the ground up, is part of the medium in which the battle will be fought. Potentially decisive battles will, without question, either involve or revolve around intense aerial combat.

Axiom No. 2. Fight the whole fight. War is like the game of "scissors-rock-paper." Think about everything, or what you don't think about is going to sneak up and bite you, you know where.

Axiom No. 3. Other things being equal, the most mobile weapon/force on the battlefield will be the decisive ingredient of the battle.

Our senior tacticians talk of the AirLand Battle and deep attack characterized by swift, violent action, thoroughly orchestrated, concentrating battle power where we want it, when we want it. Super! But that requires that we get the most from all our fighting systems.

Axiom No. 4. If an armed force has a machine that is capable of doing something, somebody will figure out a way to do that something with it. (Corollary: Whichever guy figures it out first, wins.)

Did you know that the Soviets have more helicopters than we do? Did you know that Soviet helicopters are faster and more heavily armed than ours? Did you know that, in any conjectured war between us and the Soviets, their helicopters are going to be everywhere? And that means *everywhere!* What do you suppose they're going to do when they encounter our helicopters? Why, they're going to shoot at us, keeping in mind the basic ingredient of warfare that each participant shoots at the other, until one side can't shoot anymore.

That's OK!" you say. "We won't shoot back, we'll just avoid, and failing that, evade them." After all, our primary role is as a ground attack system; each of our helicopters can kill dozens of his tracked vehicles before he gets us. We don't want to fight him in the air with helicopters, so we won't worry about it. Right?

We're pretty dumb, sometimes.

Battlefield mobility is three dimensional. If a grossly outnumbered force (that's us) is to successfully defend (good guys never shoot first) it must be able to conceive and execute bold rapid movement of forces about the battlefield. In its ground attack role, the attack helicopter moves through the air, and for all intents and purposes, fights on the ground. It can also fight in the air, in its aerial combat role. Wait a minute! We don't have an aerial combat role for our helicopters, do we? Oh sure, we talk about "self-defense" weapons and "self-defense" tactics. Don't those words bring a warm glow to your heart? Did you know that the Soviets are equipped and trained for helicopter aerial combat? *They mean to shoot at us first!* If you don't believe that, just think about it—they already outnumber our tanks with their tanks and other ground based

antiarmor systems—why do they continue to build up their attack helicopter forces? Could it be that they see our attack helicopter forces as a significant threat—one worth countering with their own attack helicopters?

Did you know that, given comparable weapons in a one-on-one fight, a helicopter will usually zap a high performance fighter? *If* . . . a lot of things: the right weapon; good eyes; good reflexes; a brain; etc., etc. (thought I'd throw that in for gee-whiz effect).

In the attack helicopter, we have a weapon which operates well across the entire spectrum of the AirLand Battle. We've got the ground attack problem licked, but what about air-to-air combat? How do we do it?

Axiom No. 5. **Aerial combat between helicopters is going to happen in the next war. If you don't believe this by now—stop reading here, and go on to another article.**

Axiom No. 6. **Aerial combat between helicopters is the same as aerial combat beween airplanes, only different.**

If we can be forgiven the blasphemy, let's think like fighter pilots for a minute. (No, Ace—put the leather helmet and white scarf away.) Picture the following scene: You're flying a mythical fighter-helicopter, designed and equipped specifically for fighting with other aircraft. (We know how to do that. See the Fighter Helicopter description below).

B Company (AH-64s) of the Umpteenth Attack Helicopter Battalion has "penetrated" the forward air defense screen and is en route to a spot some 20 kilometers to the enemy rear, where the two lead tank regiments of the second echelon tank division are struggling to get four columns

the FIGHTER HELICOPTER
CHARACTERISTICS

Speed Faster than a speeding bullet. How about as fast as possible? Straight and level high speed permits rapid closing of the fight, or (maybe more important to the wife and kids), rapid egress (that's a nice word for hauling tail) from losing situations.

Weight/Power More powerful than a locomotive. Hovering out of ground effect on a hot day at 10,000 feet MSL at max gross weight is nice. Doing nothing can be a useful tactic.

Maneuverability Able to leap tall buildings in a single bound. Maneuverability is the *prime* quality in aerial combat. It is a must to have ability to make rapid changes of direction (both horizontal *and* vertical), and rapid acceleration and deceleration. After all, these are the only two things you can use to maneuver to advantage over another helicopter. Incidentally, teetering rotor systems (like ours) provide *rotten* maneuverability.

Acquisition/ Fire Control X-ray vision would be great. Ideally, should acquire targets at the visual horizon under all lighting, weather and obscurant conditions. Actually, the acquisition/identification requirement is defined by the maximum closing speed of the engagement. We have to acquire/identify at ranges long enough to allow weapon selection and switchology and maneuvering to take place before we cross the maximum threshold of the longest range weapon on either side. Fire control for the missile is a function of its technology. Fire control for the turreted gun must be automated and capable of high dynamic tracking and firing solutions.

Weapons Long-range (missile). Engagement capability on the outer fringes of acquisition/identification ranges. Bottom line: longer than the other guy's.
Short-range (missiles and guns). When the range closes (which it *always* will) a responsive, turreted gun and/or short-range missile is a *necessity*.

Crew Size Forty-two would be nice. Survival in aerial combat is directly proportional to the number of available eyeballs in the cockpit. A crew of two steely-eyed, death-dealing daredevils is the minimum acceptable.

Aircraft Size It would help to be invisible. Little guys are hard to see, harder to hit. As small as possible, considering everything else.

of T-72s through a one-lane bottleneck. You and seven of your buddies are in a flight of four; your mission is to keep the HINDs off B Company's back while it waxes the reds in the traffic jam.

Meanwhile, the Zoomies are upstairs, duking it out with the MiGs and dodging the surface-to-air missiles (SAMs) and generally attracting a lot of attention. That makes you happy.

Eight more good guys are flying (AH-1s) on a suppression mission, loaded up with electronic countermeasure (ECM) gear and rockets, keeping the antiaircraft artillery (AAA) honest. (Oh, what the heck, you even brought some scouts along, to help out your eyeballs and to designate for the COPPERHEAD support assigned for the penetration.) They make you happy, too.

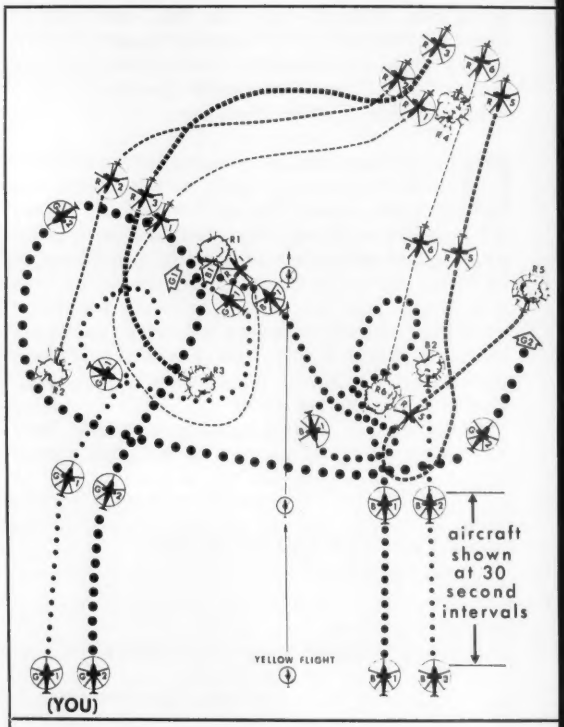
Halfway to the objective, two flights of three each Hinds come growling over the horizon, obviously intending that your next-of-kin should collect on your life insurance. You and your wingman are on the left of B Company, your other four buddies on the right.

(About this time, the scouts have flushed out a ZSU-X battery lurking in dastardly fashion about 3 minutes to your front. The snakes are maneuvering to do their thing. Again, you are happy.)

You very astutely notice that three of the Hinds are maneuvering to hook B Company from the right (your left) and three are apparently initiating a head-on attack. (The next 90 seconds are pretty confusing, so pay attention! If you ever have to do it for real, your bodily functions working in wild abandon will make it infinitely more confusing.)

For those of you who weren't smart enough to peek, go ahead—look at the picture while you read the account of the fight.

Hinds are labeled R1-R6 (R for Red—clever, huh?). You are Green 1, your wingman is Green 2. Your counterparts on the right are Blue 1 and Blue 2. B Company Flight Lead is Yellow 1. The clock starts when Hinds are acquired.



TIME (MIN:SEC)	TRANSMISSION	REMARKS
00:00	Blue 1: *I've got bogies, 1 o'clock high.*	Remember, we're in their backyard; they don't have to stay low.
00:04	Blue 2: *Got 'em, six helos closing.*	
00:10	Blue 1: *Confirm 6 Hinds, positive ID.*	
00:15	Blue 2: *Tracking one, 4 klicks.*	Blue 2 has Red 4 in his sights.
00:17	Green 1: *Got 'em too.*	
00:20	Blue 1: *Clear to fire.*	
00:23	Blue 2: *Missile off.*	
00:27	Green 1: *Got three my side.*	
00:30	Yellow 1: *Incoming missiles; flares now.*	Flares/chaff dispensed to defeat several missiles the Bolsheviks fired at B Co.
00:32	Green 1: *Missile off.*	
00:33	Blue 2: *Got the* (expletive deleted).	Worthless call

TIME (MIN:SEC)	TRANSMISSION	REMARKS
	Note: During this 30 seconds, you and your wingman have turned into the attack and, being the keenly trained killers you are, initiated a high yo-yo maneuver, since three of the dumb reds are obviously maneuvering to hook B Company, and you'd like to observe their attack from their six. Blue 1 has initiated the same maneuver against the flight (now two HINDs) on his side. Blue 2 has been too busy watching his kill burn and hasn't done anything.	
00:37	Blue 1: *Blue 2 check your six!*	Red 5 has executed a quick-stop and wingover (really, a modified yo-yo) and is now commencing a diving attack on Blue 2.
00:39	Green 2: *Trip-A lock-on! Break! Break!*	Green 2's radar warning receiver indicates ZSU-X lock-on, from what is now his 3 o'clock. He executed an evasive maneuver in order to mask and break lock. He has no faith in suppression.
00:41	Green 1: *Going after one now.*	You are golden. You are on Red 2's six and diving with guns blazing. You get him. You are a hero.
00:42	Green 2: *All clear.*	The snakes have broken lock for your wingman. The fun way. (But this is a useless call.)
00:44	Blue 1: *Blue 2 break right . . . now!*	Too late. Blue 2, while watching the smoke from his kill, has been handed his lunch.
00:46	Blue 1: *Aw (expletive deleted).*	Understandable lapse of discipline. However, not to be denied, Blue 1 is about to nerf Red 6. Revenge is sweet.
00:49	Green 1: *Green 2, where are you?*	
00:51	Green 2: *At your low six, one mile.*	Trying to get back in the flight after his digression.
	Note: Meanwhile, Red 5 has expended all his missiles at Yellow flight and is breaking left.	
00:54	Blue 1: *Somebody check my six.*	Blue 1 is pursuing Red 5, taking max range gunshots. No hits.
00:59	Yellow 1: *Blue 1 got two on your left six, closing, ¼ mile.*	Yellow 1 happens to have a good seat; he also has situational awareness.
01:02	Green 1: *I'm behind them, guns hot.*	You're about to do it again, Mr. Cool. You just totaled Red 3.
01:08	Yellow 1: *Positive ID, bogey at 12 o'clock, missile away.*	Yellow 1 has just launched a Stinger at Red 1, who is now separated from you by about 300 feet. You are *not* happy.
01:09	Green 1: *Holy (expletive deleted).*	You break hard left and down because Yellow 1 has just endangered your life. You consider breaking right and rolling hot on Yellow 1.
01:11	Yellow 1: *Blue 1 break! Break!*	Red 1 has just launched a missile at Blue 1. Blue 1 breaks hard left. Pure luck because that joins him up on you.
	(Meanwhile, Blue 1 had closed on Red 5, and scored some gun hits. Red 5 is smoking badly and losing speed; he departs the flight.)	
01:15	Green 2: *I've got one in front of me.*	Coming hard, at full power, Green 2 has overtaken Red 1 and he's beginning a gun attack.
01:20	Green 2: *Aw (expletive deleted).*	Red 1 has executed a pull-up with a left wingover. Green 2 has overshot. Just isn't his day.
01:23	Green 2: *Got one smoking at my twelve. Attacking.*	He has spotted the crippled Red 5. At this point, your wingman would attack his grandmother to get a kill.
01:26	Green 2: *Green 1, you've got one at your six, closing.*	Green 2 does something right. He has spotted Red 1, who is now diving on you.
01:29	Blue 1: *Green 1, break left!*	You turn hard left, with your feet in the trees. Red 1 tries to turn with you, overshoots, pulls up to look for you. Blue 1 makes a zero-energy left turn onto Red 1's low six, and nonchalantly blows his stuff away with a 500-foot gunshot.
01:31	Green 2: *Hot diggety damn!*	Green 2 has finished the coup-de-grace on Red 5.

This one's only make-believe, but we can still get smarter from it. The whole fight lasted a minute and a half, and included 31 radio calls. Communication discipline is a must. Every transmission should be related to somebody's tail—either saving yours or flaming his.

Without the dedicated suppression mission, it's possible that the bad guys' AAA could have forced us down into the nap-of-the-earth. Aerial combat when you're denied use of the vertical is like kissing your girl in a hammock—you might get something started, but you'll wind up on the ground for sure. Remember, the only reason you were out there was to keep the Hinds from keeping our heavies from getting to where they needed to be, and the baddies' air defense can keep us from keeping them from keeping us from doing our job. Elimination/suppression of air defense systems must be the first priority.

Along similar lines, the fast-movers' fight above you was of great consequence to the preservation of your health. In essence, they took the SAM's out of your immediate problem. Remember, the converse of keeping it simple for ourselves is making it complicated for them.

See first, shoot first and you'll be able to come back the next day. Thanks to Blue 2's long-range acquisition/engagement capability, Red 4 never made it into the fight. And it's anybody's guess how things would have turned out if he had. Any close combat is a delicate balance of courage, capabilities and circumstances. When it's over, you're never really sure of what *might* have been, only of what *was*. See him first, kill him first, survive. Simple, huh?

Know your weapons. Yellow 1 almost spoiled your whole day. (Incidentally, you goofed up—you broke *away* from a heat-seeker, and that's kind of like turning your back on the flight surgeon during your annual physical.) But, it worked out, which tells us that . . . .

Luck is important (but no substitute for skill and icy-nerved determination). There is no right way to fight a fight like this. Rely on your training to make the basics (aircraft handling/maneuvering, gunnery, C^3) instinctive, and from then on it's just a matter of whatever works.

The fundamentals of aerial combat are the same, whether you're flying an F-18 or a TH-55 with a .38 mounted on the chin bubble. Maybe in other articles we can talk specifics, but the basics are the basics.

Being outnumbered in a fight like this is not as bad as you might think. It's not great, only not too bad. A many-vs-many fight often deteriorates to a series of one-vs-one fights, and the whole mess is so fluid that massing of forces just doesn't usually happen. The key here is that whenever you can't (or don't) know where everybody is all the time, the smart guy will assume that he's outnumbered and behave accordingly.

Any aerial combat (even a make-believe one) offers food for thought for a thousand more. The combinations of maneuvers, formations, procedures, weapons, force ratios, etc., are endless.

And on and on and on. If you try, you could pull a couple of dozen equally valid lessons out of our make-believe fight. That's the idea. Think!

We've spouted some axioms, invented a mythical helicopter, and fought a make-believe battle. Did you get any smarter? We did.

The AirLand Battle and extended battlefield concepts and doctrine won't pay the first dime in dividends until we recognize that the battlefield is not a conglomeration of separate battles. It is continuous, in time *and* space. Helicopter aerial combat is going to happen, either on our terms or theirs. You'd think we'd be doing a better job of getting ready for it. But probably everybody gets dumb, sometimes.

(Incidentally, B Company got 103 T-72s and lost 2 AH-64s, neither of which, to your delight, was Yellow 1, whom you crowned with a bowl of mashed potatoes later that day in the officers' mess. Oh by the way—the commie tank regiments never made it to the main battle area. Well done! Mission accomplished. Silver Stars for everybody.)

AIR TO AIR

The views of the author do not purport to reflect the positions of the Department of the Army nor the Department of Defense

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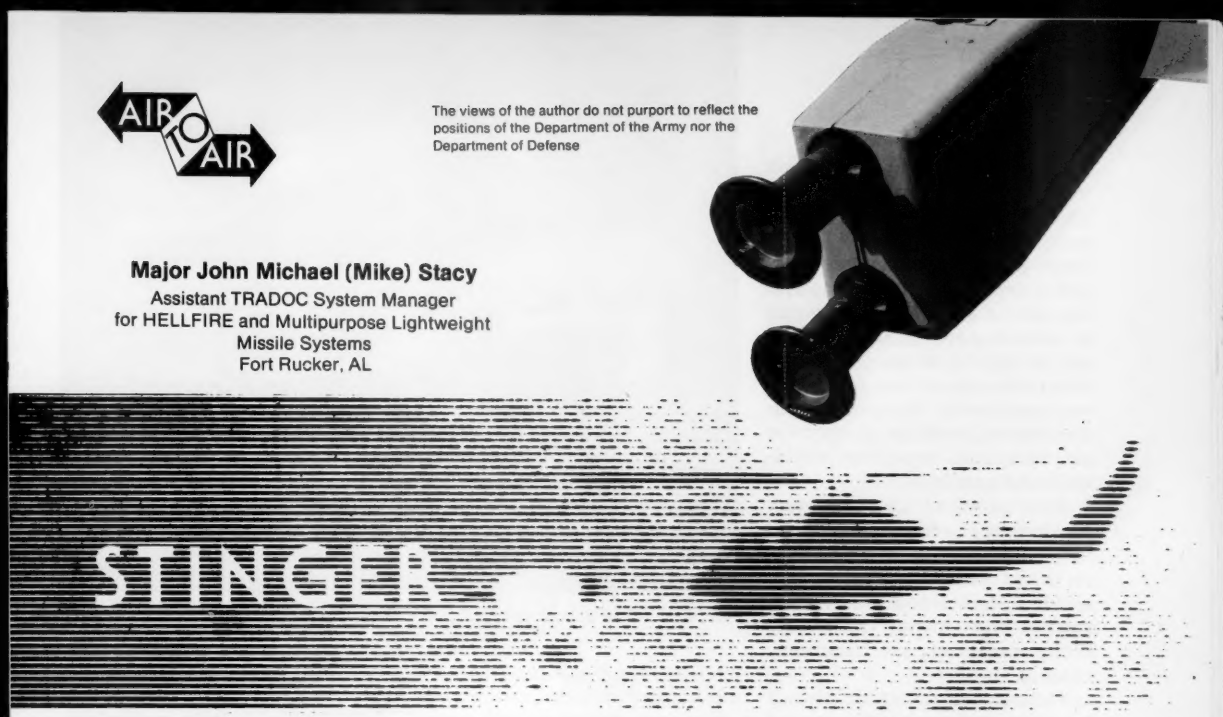


to kill a HIND

APACHE 21 this is Kiowa 66, Hind eleven o'clock, 4,200 meters—target killed, continue mission." Immediate acquisition and engagement of the threat target is the requirement for self-defense of our helicopters. How will we accomplish this task on the future battlefield?

For the past several years, Army Aviation has been carefully watching the evolution and growth of the Soviet and Warsaw Pact helicopter threat. Their armed helicopters, the Hind and Hip, have evolved into some of the most lethal and sophisticated weapon systems known to modern day warriors. In addition, the quantities have steadily increased to a point where we are severely outnumbered if we ever meet one another on the battlefield. If you imagine for a moment a typical European or Middle Eastern battlefield scenario, you can quickly envision the high probability of helicopter versus helicopter encounters. In the main battle area, the majority of armed helicopters on both sides will be heavily dedicated to support of the antiarmor mission—also, it is at this point that we can expect our limited air defense systems to be primarily committed to the attack of fast movers, and as our helicopters can make themselves almost invulnerable to certain air defense systems, so might we expect the enemy to be able to do the same. Therefore, we would logically expect frequent and routine encounters to occur in the main battle area since we will be sharing the same airspace.

We believe the same to be true in our lightly defended areas, such as the covering force and our flank security. There we would expect our air defense systems to be sparsely employed with our helicopters carrying a large share of the burden of defending. There too, we could expect the Hind and Hip to be used frequently to break through,

Glossary

AGL	above ground level
DARCOM	Army Materiel Development and Readiness Command
Hind	Mi-24
Hip	Mi-8
HUD	heads-up display
MANPADS	man-portable air defense system
MICOM	U.S. Army Missile Command
NOE	nap-of-the-earth
ROC	required operational capability
TOW	tube-launched, optically-tracked, wire-guided
TRADOC	U.S. Army Training and Doctrine Command

resulting in numerous encounters with our helicopters. And what about our rear areas? It is certainly conceivable that an airmobile raid could occur in our support areas where our air defense assets also are limited in number. How can we protect ourselves? One effective way would be to use the attack helicopter against rear area intervention, whether the attack is from the ground or the air. If from the air, helicopter encounters will almost certainly occur.

What problems can we expect to encounter as helicopter pilots if Hinds and Hips are everywhere on the battlefield? What can they do to us? And for that matter, what can we do to them? Answers to these questions are seemingly obvious.

The enemy is equipped with high technology fire control systems which can accurately acquire and engage targets with 12.7 and 23 mm guns, rockets and antitank missiles. Well, so what? Don't we have similar systems? Yes, but the opponent carries much more armament which in some instances is effective at ranges greater than ours and travels at higher velocities. If they see us first, just using onboard systems, they have the capability to engage at standoff, or certainly more quickly at parity. In other words, the guy with the fastest draw wins.

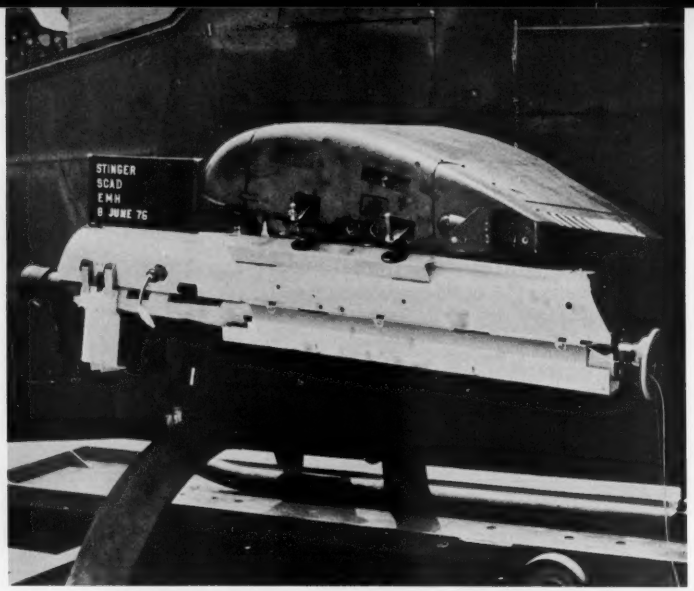


FIGURE 1: 1976 Stinger test

Realizing that there's a lot more of them than there are of us, and that they can "get" us first, it's fair to ask if they have any other advantages? Indeed! If they miss the first time, and we choose to run, they can pursue and overtake us. What if we're flying NOE—are we a target for them then? Once again, yes.

When we're speaking NOE, the enemy could liken us to any other moving ground target, particularly if they are operating in their normal flight profile of about 300 feet AGL. And if it were practicable for them to operate NOE, then they would still be able to acquire us when we pop-up and maneuver about the battlefield wherever any degree of intervisibility might exist.

With a threat like that, how can we protect ourselves? Can we field more air defense systems? What

FIGURE 2: The missile is a proven, fielded defense against air threats

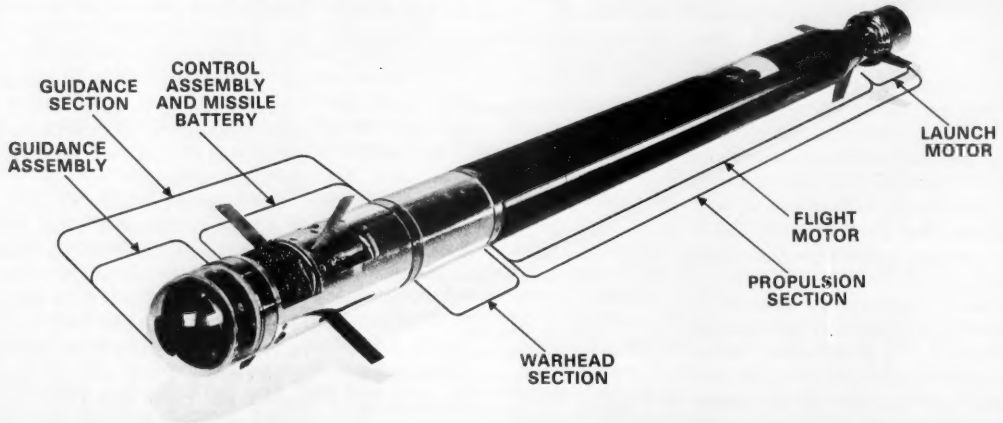


FIGURE 3: The Stinger weapon is lightweight, rugged and adaptable

about the Artillery and the Air Force—can't they help? Well, to protect ourselves, we will have to rely on some other elements of the total force, but what about the times when we need that support in 10 seconds or less? What are our chances of getting it?

When a Hind or Hip has us in his sight, that's not the time to request a fire mission or to look up the frequency for the air defense commanders to cue them or to divert the Air Force. No, it's the time when we must count on ourselves to survive, trying either to evade or, if we happen to be in an AH-1 Cobra or possibly an AH-64 APACHE, engaging them with our gun or TOW or laser HELLFIRE—depending only upon our training and individual skill to defeat the threat. But remember, even if we have the range—his ordnance will get to us before ours can get to him! Therefore, there's got to be a better way to engage threat helicopters; and we must develop it.

Army Aviation is not naive. In fact, our people have put forth a lot of time and hard work toward identifying and developing new systems and methods for increased effectiveness and survivability. As a result of these efforts, TRADOC began laying the path for a quick, simple, adaptable, low cost, fire and forget system that could do the job. Basically, TRADOC reexamined the work which had been started in 1976 by MICOM and General Dynamics, Pomona Division. It was at that time that a ground-to-air Stinger missile was successfully launched from an AH-1 (figure 1). It was found that employing a Stinger from a helicopter was a viable deterrent and formidable means of protecting the helicopter against the threat. Therefore, in 1979, as the threat became increasingly obvious, it was decided that TRADOC would begin pursuing development of a requirement for Stinger in an air-to-air role to provide helicopter self-protection.

Now, let's examine the proposed helicopter self-protect system. The Stinger missile is delivered as a certified round from the production facility to the user (figure 2). It is sealed in the launch tube assembly and is ready to use without any additional testing or preparation.

The air-to-air Stinger round is the same as used in the MANPADS role, requiring no further development. For the MANPADS application, the gunner adds the separable gripstock and the weapon is ready for use (figure 3). For the air-to-air helicopter role, the field crew simply removes the sight assembly and the shoulder strap and the round is ready for quick insertion into a launcher. Of course,

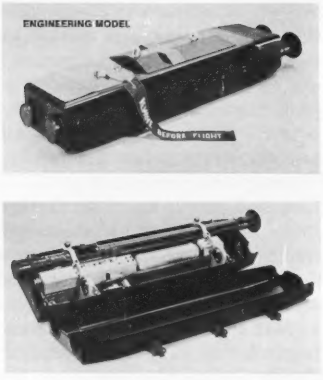
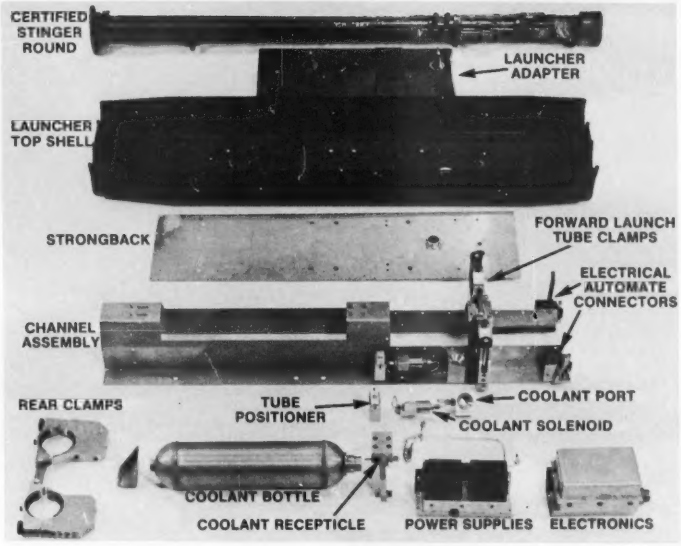


FIGURE 4: Missile launcher package



the benefits resulting from common logistics are obvious.

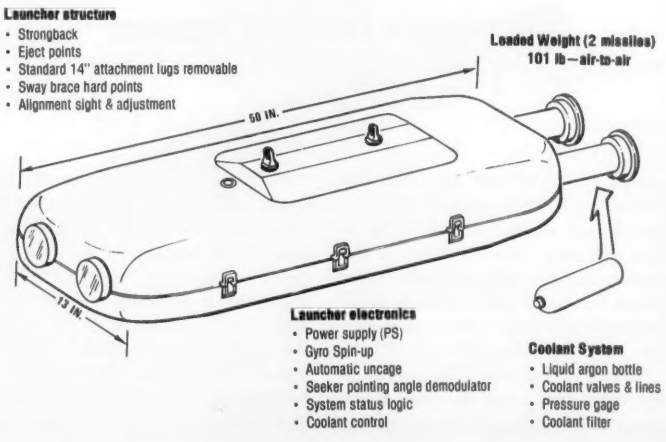
A simple sighting device is required in the helicopter to help align the aircraft with the target. A moving reticle HUD type sight is preferable. Of course such a sight is already available onboard attack helicopters, but must be added for application of the system on scout helicopters, although the mast-mounted sight can be used too.

The "two-missile system" is small and lightweight (figure 4). Each missile in its launch tube weighs about 26 pounds and a launcher once developed could be expected to weigh around 50 pounds (figure 5). All things considered, weight impact would be about 160 pounds for a full-up two missile system on scouts. Total weight impact on an attack helicopter would be about 120 pounds, using existing stores and sight.

The air-to-air fire control system is simple to operate and therefore requires minimum pilot training (figure 6). The avionics system enhances the pilot's natural ability to use tracking instruments. The pilot merely aligns the target in the boresight reference of the HUD and squeezes the two position trigger to the first position. An audio tone gives the pilot the first indication that the missile may have acquired the target. The automatic uncage circuit examines the spectral components of the received signal, compares target and background components, and uncages the missile seeker when the signal represents a target. The seeker tracks the target and the pipper on the HUD is aligned to where the seeker is pointing.

Hearing the acquisition tone and seeing the blinking pipper over-

FIGURE 5: The Launcher Assembly is lightweight, easy to maintain and quick to reload



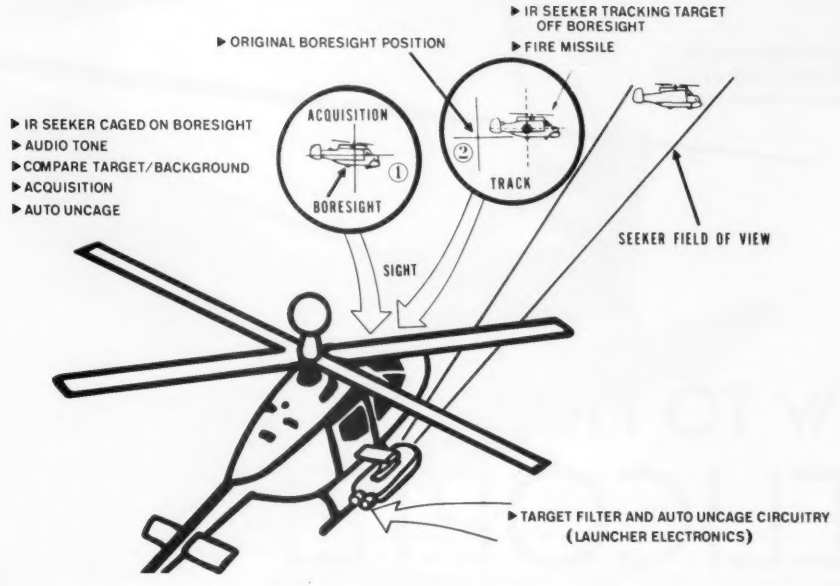


FIGURE 6: Air-to-air fire control affords ease of operation

laying the target on the HUD gives the pilot confidence that the missile is tracking the target. He may then squeeze the trigger to the second position to fire the missile. If the pipper on the HUD indicates that the seeker is not tracking the target, the pilot can recage the seeker by releasing the trigger.

If the pilot initially squeezes the trigger to the second positon, the missile firing sequence automatically occurs when the automatic uncage circuit detects the target signal. In either case, the pilot has the option to override the automatic uncage system and fire the missile. Once the missile has been fired, the pilot is free to maneuver, remask or engage a subsequent target.

Now that we have discussed the system, let's turn our attention to the program. Recently, TRADOC and DARCOM combined forces to produce an ROC document to support plans for the development of air-to-air Stinger. In that document, air-to-air Stinger is identified for use on both scout and attack helicopters as a self-protect weapon system. Both systems need the capability, but it is clearly the scout that is unarmed and therefore most vulnerable. However, by arming the scout with an air-to-air missile, it then is not only capable of protecting itself, but also the attack/scout team. By providing team protection as a part of the scout's inherent role of local security, the scout allows the attack helicopter to sustain accomplishment of its primary mission—that of killing tanks.

With respect to current program status, the air-to-air missile program has not yet been fully initiated. In other words, it is not a funded development program. Actions are ongoing, however, to fund it with plans to enter advanced development in fiscal year 1983 and followed by full scale engineering development in fiscal year 1984.

Currently ongoing at the United States Army Aviation Center, Ft. Rucker, AL, is a TRADOC Concept Evaluation Program designed to examine the potential utility of a helicopter air-to-air missile in a terrain flight environment. Previous tests have already proven the air-to-air Stinger concept against high altitude targets as well as targets flying just above the horizon. But since we'll be operating in the trees, the prudent question to be asked is, "How effective will we be with an air-to-air missile in that environment and particularly if we should be operating against enemy targets at similar altitudes?"

The Self-Protect Air-to-Air Missile Concept Evaluation Program (SAMCEP) conducted by the United States Army Aviation Board, Ft. Rucker, was concluded early this month. Pending the results, SAMCEP may be a giant step forward for Army Aviation in the development of a helicopter self-protect air-to-air weapon.

The ***Aviation Digest*** thanks ***Soviet Military Review*** for permission to reprint this article

HOW TO FIGHT HELICOPTERS

Colonel M. Belov

THE PROBLEM OF helicopter fighting came to the fore during the local wars of the 1970s. It was at that time too that the first steps were taken to solve it. The foreign press reported that to destroy American helicopters in South Vietnam, fighters of the National Liberation Front stretched wires between trees, placed hardly discernible obstacles on likely landing pads and laid directional mines. These "passive" methods and tactics were effective when helicopters operated at low altitudes or in landing approach.

The 1973 combat operations in the Middle East showed that helicopters' tactical possibilities have considerably grown. Particularly effective were strikes at armored and other objectives without entering the enemy AA [antiaircraft] defense area and surprise attacks in approaching targets at extremely low altitudes.

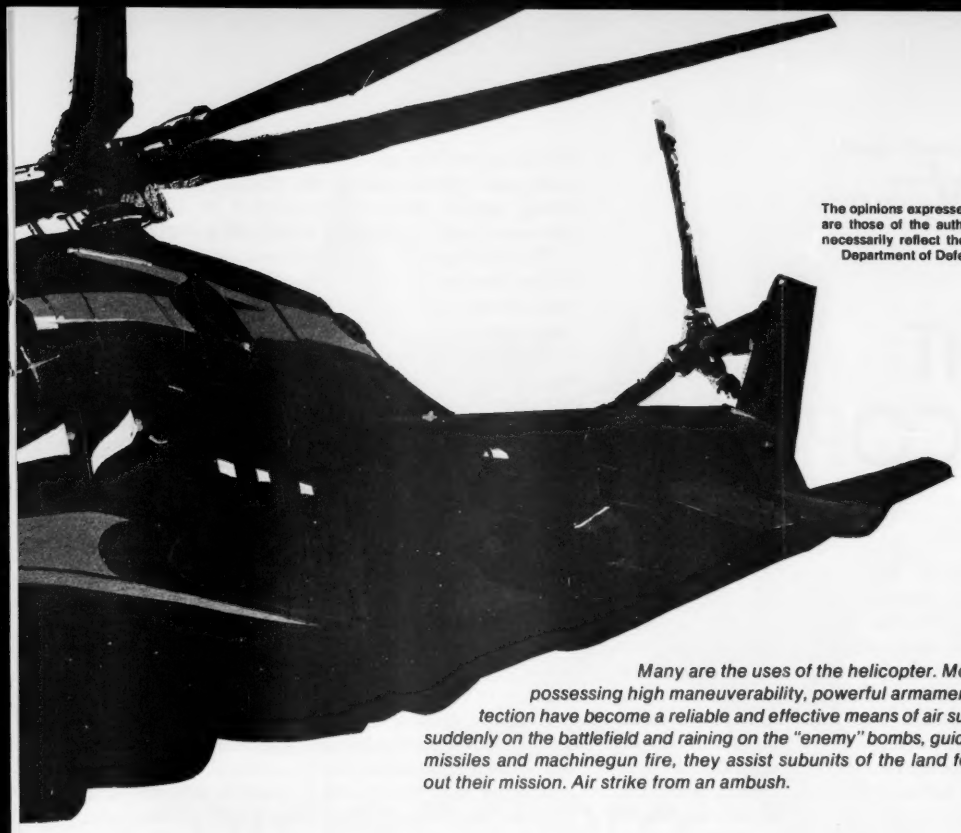
In dual situations purposely created at exercises, losses of helicopters have always been several times smaller than those of tanks.

According to estimates of umpires at an exercise, helicopters of the "Orange" forces "destroyed" 200 tanks, 6 fire support helicopters, 2 tactical fighters, several multipurpose and reconnaissance helicopters, and also a great number of automobiles of the "Blue" forces. During the same 4.5 days of combat operations, the Orange forces "lost" only four helicopters. Thus, helicopters have proved most effective as a versatile fire system highly superior to other combat vehicles as regards observation, maneuverability and choice of the time and place of delivering a blow. Plans for designing future combat helicopters envisage further enhancement of their fighting power, survivability and ability to operate in any weather.

All this complicates the problem of helicopter fighting and makes it necessary to use practically all weapons available to destroy them.

As regards organization and tactics, foreign specialists propose to improve the systems of detecting enemy helicopters and alerting friendly troops. Most valuable in this respect is the experience in the use of special mobile radars with high capability of detecting and tracking low altitude air targets.

Also of great importance are timely determination of helicopter-threatened directions, maximum advancement of radar barrier toward the enemy, and choice of positions for antiaircraft weapons with small closure angles as close as possible to subunits to be protected.



The opinions expressed in this article are those of the author and do not necessarily reflect the views of any Department of Defense agency

Many are the uses of the helicopter. Modern helicopters possessing high maneuverability, powerful armament and armor protection have become a reliable and effective means of air support. Appearing suddenly on the battlefield and raining on the "enemy" bombs, guided and unguided missiles and machinegun fire, they assist subunits of the land forces in carrying out their mission. Air strike from an ambush.

Low altitude antiaircraft weapons being concentrated in the tactical link, it is believed that this link must be well provided with an adequate antihelicopter system. It is recommended to locate antiaircraft systems directly within battle formations of land forces subunits and to move them together with the latter. It is also advisable constantly to have combat-ready antiaircraft weapons specially detailed to fight unexpectedly appearing enemy helicopters. In this connection, much attention is now paid to developing AA guided missile systems mounted on tanks, infantry fighting vehicles and armored cars, with sufficient survivability and mobility and capable of ensuring constant air protection of troops in a dynamic battle.

Certain armies are carrying out experiments in the use of antitank projectiles for helicopter fighting and attempting to create a combined system of short-range missile weapon which could be used to advantage in fighting both ground fighting vehicles and low flying airplanes and helicopters.

To destroy helicopters on pads located close to the enemy forward edge, artillery is most likely to be used. It is also recommended to set antihelicopter barrages of high explosive and scattering projectiles. During landing approach and after landing, helicopters can be destroyed by direct fire of all weapons available, flame throwing and incendiary weapons and mines, particularly directional.

Thus, practically all kinds of weapons organic to land forces may be used to fight helicopters. However, final solution of the probem, far from drawing nearer, is further delayed due to constant improvement of helicopters' combat characteristics and methods of use. Indeed, when striking from low altitudes and distances not exceeding 3 to 5 kilometers, helicopters are practically invulnerable to ground antiaircraft weapons. This is also true of helicopters operating individually or in small groups.

Therefore, it has become vital to get a weapon which could compete with the helicopter in respect of combat power, tactical possibilities, etc. Logic and historical experience suggest that such a weapon is the helicopter itself. Just as tanks have always been the most effective weapon against tanks, helicopers are the most efficacious means of fighting helicopters. Use of helicopters by both warring sides will inevitably lead to clashes between them. Like tank battles of the past wars, a future war between well-equipped

HOW TO FIGHT HELICOPTERS

continued

armies is bound to involve helicopter battles.

In considering the problem of using helicopters against helicopters, foreign military specialists proceed from the assumption that helicopters of all designs and purposes must carry adequate protective weaponry and be adapted for aerial combat. Combat helicopters intended for attacking similar helicopters and repelling enemy fighter attacks must have a more powerful armament specially designed to destroy aerial targets.

At present there are two viewpoints on the development of combat helicopters. One of them favors the creation of a general-purpose vehicle, i.e., an assault helicopter capable of providing fire support for units and subunits in a combined arms battle, destroying tanks and other armored vehicles, and waging aerial combat with similar machines and even with enemy fighter planes. The other point of view is aimed at a more distant future and envisages differentiated development of combat helicopters, e.g., assault helicopters for fire support of units and subunits of land forces and destruction of different ground targets; antitank helicopters specially intended to destroy tanks and other armored vehicles; fighter helicopters for destoying enemy combat helicopters and other aerial targets.

Supporters of the second point of view quote past experience to prove that any multipurpose weapon loses its effectiveness to a certain degree when fulfilling a specific mission, whereas specialization opens up vast possibilities for developing an optimal armament system and the most effective tactics. It is suggested that in the future there may arise the need of a one-man combat helicopter capable of fighting aerial battles. It is believed that such a machine must be light, high speed and very maneuverable, armed with cannon and air-to-air guided missiles.

Demands made on combat helicopters are becoming increasingly rigid, the most important being the ability to fly a mission skirting accidents of the terrain at extremely low altitudes in complicated meteorological conditions both by day and at night, ability to maneuver easily and quickly change the altitude, direction and flying speed, perform aerobatics in an antiflak maneuver and in attacking aerial and ground targets.

Proceeding from the experience of the local wars in the Southeast Asia and the Middle East, foreign military specialists hold that combat helicopters are less vulnerable than airplanes when skillfully maneuvered or flying at extremely low altitudes. The high maneuverability of these flying vehicles enables the pilots either to evade attacking fighter planes by making use of accidents of the terrain, river beds, forests, buildings, etc., or to deliver a surprise blow from a predetermined direction.

Antitank guided missiles, 20 to 30 millimeter automatic cannon and unguided antitank missiles have proved to be the most suitable kinds of armament for combat helicopters. The cannon is preferred to other weapons, for it allows fire both at ground and air targets. However, it is not regarded sufficiently effective against fighter planes. Therefore, certain armies are working on versions of air-to-air guided missiles to be installed on combat helicopters.

Different variants of combat actions for helicopters armed with such missiles are also being worked out. For instance, to avoid fire of an attacking plane, a helicopter may fly toward it at a low altitude. This reduces the time under fire from the attacking plane, because the latter will be forced to break off the attack in order to avoid crashing to the ground. As soon as the fighter has flown over the helicopter, the latter makes a 180-degree turn and fires a missile.

Proceeding from the character of a modern combined arms battle, helicopter battles, and also fighting between helicopters and airplanes are most likely to take place during escort of attacking land forces by helicopters, carrying out missions to destroy control points, nuclear attack weapons, helicopters on the ground, and other objectives.

In all these cases, combat helicopters may fulfill missions to destroy aerial targets, cooperating either with the land forces or with each other.

If combat helicopters are used to destroy similar enemy machines, they can operate from ambushes by waiting under cover for an enemy air raid in order to take off and make surprise missile launchings. More often than not such tactics will be used in a defensive battle, while offensive operations will call for more resolute and active actions.

Thus, the problem of helicopter fighting is being solved on the basis of integrated use of different combined arms weapons and tactics. Helicopter combats are becoming a component of the modern combined arms battle which may be fought either in cooperation with land forces or independently by helicopter subunits or individual helicopters.

AIR TO AIR

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Executive Officer
101st Airborne Division (Air Assault)
Fort Campbell, KY

a mideastern scenario proposal

It may be necessary to read the article beginning on the next page more than once to assess its full meaning. The United States evolved the airmobility concept and refined it throughout the Vietnam era. But, that ended almost 10 years ago. In the past decade, along with all their other gains, the Soviets who have never been too proud to borrow on a good idea, have made tremendous strides in this field. In fact, we may have just been left behind in the development of air assault tactics, doctrine and the deployment of such forces. Hopefully, this article will help stimulate an exchange of new views within the American aviation community, particularly from my air assault colleagues here at Ft. Campbell. I would like to hear views on the attack battalions tactics, intelligence integration and dissemination, how to better integrate air assets with the ground tactical plan, what threat is a Soviet motorized division that gets occasional helicopter support from Frontal Aviation and others. Let's put them down on paper!

IT WAS STILL dark that morning in March when he was shaken awake by one of his night shift personnel. With only a bare 4 hours' rest since last night's activities he needed the early morning sub-freezing temperatures to wake him up. Shivering, he grabbed his clothes quickly and dressed hurriedly so that he could get on down to the briefing room and find out what was scheduled for the day. It could be anything.

Ever since the Soviet forces' sudden determined push out of Afghanistan directly for the Strait of Hormuz 2 months ago, with a fairly successful secondary attack in the region of Tabriz clouding the real objective—the Strait, their progress had been rapid until the sudden introduction of American airborne and marine forces along the coast from Bandar Abbas to Chah Bahar. At that time, with the subsequent arrival of the American air assault division and a continuing stream of armored reinforcements, American operations out of strong points along the coast had managed to blunt and stop the Soviet advance along the mountains south and southeast of Kerman in southeast central Iran.

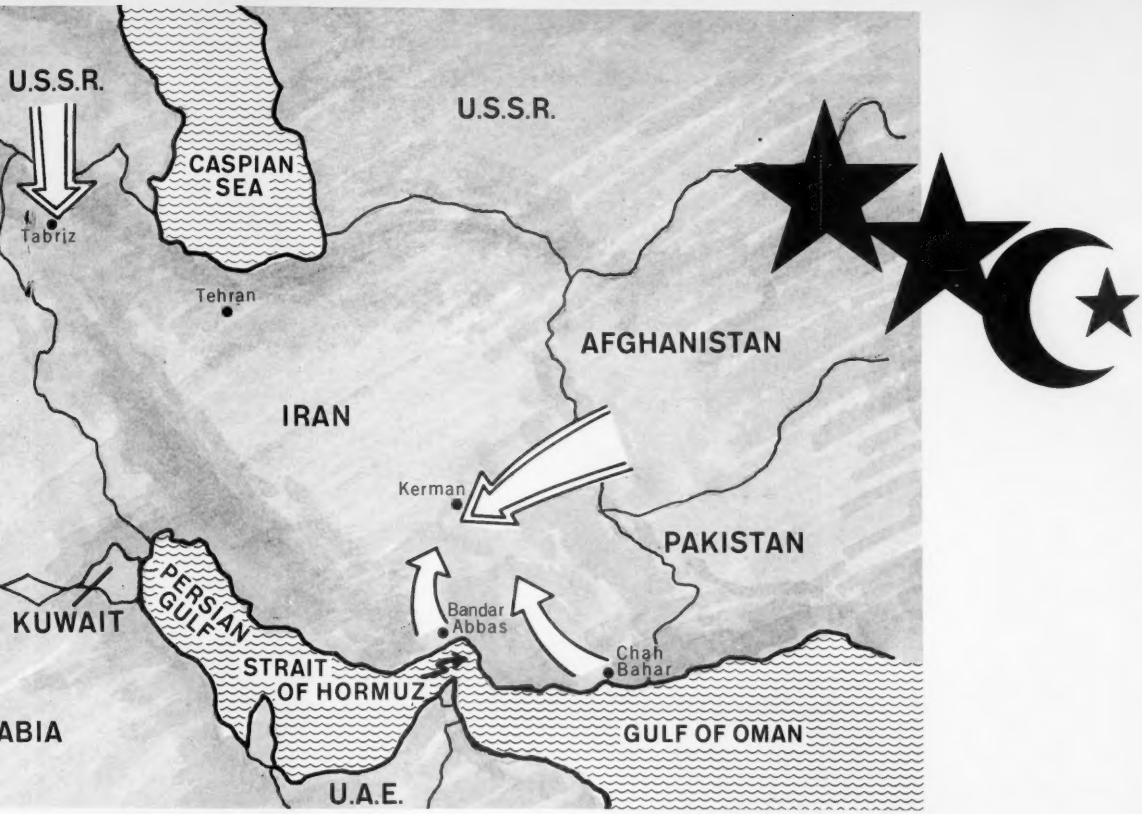
This much of the strategy he had absorbed from his own observations as a commander of an aviation lift company. He knew from the previous week's furious struggles about the importance attached to the Strait by each of the world powers. In these days of increasing oil shortages, with world attention focused on the Iraqi-Iranian border conflict, and the ease with which Afghanistan had been subdued, it had not been surprising to see the Soviets make the attempt to move across the relatively undefended southeastern part of Iran with the objective of controlling the Strait of Hormuz and establishing for itself port facilities along the Arabian Sea.

At any rate, he had seen some furious fighting since the United States had chosen to land forces as quickly as it did in an effort to thwart the Soviets in achieving their goals. At the moment the issue was in doubt militarily, in his opinion, as to just who would succeed in this latest world game of brinksmanship. All he knew was that he was in the middle of it all and had already lost four of his newest twin engine troop carrying helicopters in spite of their touted ability to survive on the mid to high intensity battlefield. Even worse was the fact that none of the crews had yet been recovered despite repeated attempts. Neither the crews nor the equipment were easy to replace this far from home.

Almost sunrise, it was time to get to the briefing room and gather the crews for today's missions. Hopefully, maintenance got the worst of yesterday's

battle damage repaired. Amazing how fast things like that got accomplished under the pressure of war. The supply line still had not caught up with them on a sustained basis. Maybe the enemy has the same problems . . . .

As he pushed into the operations tent, the situation maps portrayed the success of yesterday's attack. The trapped enemy forces were being defeated in detail. It was the same tactic they had employed from the onset with amazing success, seizure of key terrain by air assault forces coincident with a well-coordinated and supported armored attack and subsequent linkups. In addition, both sides had experienced moderate success with their tactical fighters supporting these gains. Attack helicopters had unquestionably caused the most severe losses to the attacking armor of both sides. Yesterday's assault, however, was the first in which every available attack helicopter was employed to include our own modified troop carriers with strap-on air-to-air and air-to-ground missile systems. The highly successful force was able to not only strip away most of the defender's attack and observation helicopters but was also responsible for knocking out a number of enemy tanks. Our



ground units were then completely free to concentrate on identifying weak points in the enemy's ground defenses and developing a penetration.

It was surprising to see the effectiveness of electronic warfare operations. Broadband jamming along with some particularly lucrative monitoring of communications security violations by the enemy resulted in the virtual annihilation of a major reinforcing enemy force that was being rushed up by helicopters. The combined artillery barrage which was called in on their landing zone had turned it into a massive kill zone.

As he lit up a cigarette and leaned back in a chair, he considered the events that had transpired the previous day. Numerous tactical errors were committed by the enemy forces. Their defensive positions and attack helicopter firing positions had been rather predictable and easily neutralized or bypassed. They seemed to have had extreme difficulty keeping their efforts coordinated, particularly that of piecing together the "big picture" soon enough in order to distinguish the main attack from the supporting attack. In most cases they were frozen in place until it was too late for reinforcements to move without being subjected to the withering fires of our own tactical fighters and artillery fires.

Both sides had been entirely correct in molding their forces around the concept of armored-air assault forces. This country was just too big to attempt any kind of classical frontline defense; all flanks were assailable. Topography facilitated the seizure of the key terrain by helicopter-borne forces and also made easy the rapid movement of armor along the generally level plateaus. It was fortunate that the latest helicopter designs had been available and that the crews were trained to operate in this high density altitude. New, modernized helicopters had proven their worth many times over; the older models had proved to be of little value except along lower elevations and in the rear areas.

Intelligence had been unreliable in the beginning, but once all sources had been identified, tapped and integrated (especially aviator debriefings and signal intercepts) some very valuable preplanning intelligence was then available.

Enemy air defenses had proved to be relatively ineffective against our low flying helicopters. Thus far, our losses had been limited to two aircraft downed

by close air support aircraft, another to a surface-to-air missile, and the last destroyed by a direct hit from a tank main gun in a landing zone. Otherwise, carefully chosen multiple routes with good separation between aircraft operating in flights of four to six had allowed our aircraft to maximize their speed and maneuverability. Tactics, in addition to some splendid aircraft design work which incorporated all the latest concepts of survivability in a high threat environment, had so far allowed some very successful air assault operations. The enemy had come in hopes of attempting the same (to paraphrase an old saying, "The best defense against a helicopter is another one"), but they had had poor success in countering our air-to-air operations which incorporated selected attack units used for that sole purpose. Indeed, in the beginning they were totally surprised, both tactically and technologically, and were totally unprepared to cope with such innovative tactics. In fact, most of their losses were attributed to our attack aircraft operations with the oldest technique of all in aerial warfare causing the most damage—air-to-air gunnery. Although their attempts at infrared suppression and chaff dispensing worked to a limited extent, cannon shells impacting around the cockpit and other vulnerable areas quickly downed their aircraft. The threat posed by our dedicated interceptor helicopters caused a tremendous drain on enemy assets, since the latter was forced to divert precious resources from antiarmor to air-to-air operations in order to protect their remaining attack helicopters which were operating in a diminished antiarmor mode.

Things have not really been so bad, he thought. Thus far, fuel and supplies have not posed as significant a problem as had been feared, since host country and captured stocks had amply augmented our own. Our lines of communication and resupply had remained relatively intact because most movements were conducted at night and our air forces retained air superiority over our own rear lines. The roads remained in good state of repair and the large number of refugees available had provided a plentiful source of labor for keeping them open. Interdiction raids by enemy high performance aircraft had proven costly to them, especially against point targets which were heavily defended by our own air defense units.

Operations up to this point had remained strictly conventional with neither side resorting to chemical or nuclear weapons. Lucky for us, he thought. Protective clothing is just too much trouble! Better to be dead than have to work in that clothing, especially trying to fly a helicopter! Let's just hope that neither side decides to resort to those weapons.

As the last crew came in and sat down, he listened as the operations officer briefed them on the mission and the concept of the ground tactical plan. He did not know whether to smile or groan as he saw the plan unfold. In order to exploit the penetration of yesterday, an airborne division would be used to seize the primary objective 90 kilometers to the front. An armored spearhead, whose sole objective was to linkup, would use the main southwest-northeast road. Key terrain along the attack axis would be secured by forces air assaulted ahead of the spearhead to assure the latter's uninterrupted and rapid advance. The attack would be supported by all available helicopters—troop carriers, scout and attack models as well as all artillery and close air support available. The Air Force would attempt to maintain local air superiority for the next 48 hours and air parity, at a minimum, after that. The attack would begin tonight, 1 hour after sundown, with the linkup to be completed absolutely no later than the second morning after the attack is launched. Pretty ambitious, he thought to himself! Well that's the idea these days, marry up the firepower of the tank with the speed and mobility of the helicopter and move out. Hopefully, naval gunfire and air also will be integrated into the operation. In the meantime, there is enough time to get all the aircraft ready, crews briefed thoroughly, and make a maximum coordinated effort tonight. With as much night training as we have conducted we should have no problems. The night operations area is a known enemy weakness, so we should catch him off guard. The age old principal of war, *surprise,* is in our favor. He smiled; if luck held out, he might be able to add a couple of more stars to those already painted on the side of his helicopter. Those new air-to-air missiles were fantastic. He wondered if the new fuel points had been brought up yet. He also needed to doublecheck his crew's survival gear one more time. That was too close a call yesterday when those cannon shells from that attacking jet crossed in front of and beneath their aircraft as they were on short final to that last landing zone. If they had to walk out of here, it would take days to cross the terrain and avoid capture. Several crews exiting downed aircraft had been observed heading for rendevouz points, but so far no luck on picking them up.

The local populace was entirely unpredictable too. With their faceless expressions you never knew what was on their minds. Things were difficult enough without having to lose more sleep trying to keep our belongings from being stolen or from being blown up by sapper activities. Guard duty combined with all these surge missions had really taken its toll. Maybe this final assault today will allow us to wrap this campaign up and get things in order again. Hey, it's time to eat! There go two of my sister-unit commanders. "Hey, Dimitre and Ivan, hold up! Let's go try some of those captured American C rations with our tea and black bread." On to Bandar Abbas!

PILOT ERROR MISHAPS

THE PHILOSOPHER George Santayana stated that those who have not studied history are doomed to relive it. An old aviation safety officer stated that there are no new ways to crash an airplane—they've all been discovered. It appears that some Army aviators should have studied aviation mishap history more closely. The record for fiscal year (FY) 1981 indicates pilot error mishaps of such diversity as to generate suspicion that our aviators are attempting to break new ground (no pun intended) in mishap classification. Although diverse in their methods, aviators have not produced any new type mishaps—just more of the same.

After 2 years of a declining rate, aviation mishaps are on the rise. Hopefully the record for FY 1981 is an aberration and not a trend. Army Aviation must get back on track and adhere to a positive mishap prevention program, and it can.

An important element of the program is standardization. Not just lip service to standardization but a *dedicated* commitment by all who operate or who are responsible for operation of Army aircraft.

Standardized procedures could have prevented pilot error mishaps such as:

- Autorotational mishaps (with instructor pilot (IP) onboard)
  Hovering
  Sod touchdown
  Low level with night vision goggles
- Tail rotor stalls
  OH-58 Kiowa
  UH-1 Huey (with SIP aboard)
- IMC (instrument meteorological conditions) takeoff
- Whiteouts
- Dynamic rollovers (with IP onboard)
- Deceleration (with IP onboard)
- Tachometer generator failure mistaken for an engine failure (with IP onboard)
- Simulated single engine go-around (with IP onboard)

Note that many of the above listed mishaps occurred with an IP onboard. Their problems were generally the result of deviations from standardized procedures as outlined in the aircrew training manual or the operator's manual:

- The pilot in command of the UH-1 that lost tail rotor control was a standardization IP who exceeded power limitations at 11,000 feet msl. He had not completed his Performance Planning Card.
- The dynamic rollovers occurred on level terrain while the IPs were preoccupied with tasks other than instructing.
- The tachometer generator failure was mistaken for an engine failure because the IP did not follow the procedures for the emergency as outlined in the operator's manual.
- The simulated single engine go-around almost ended in disaster because the IP had his student initiate the maneuver too late, too low and too slow, in contravention to proper procedures as listed in the operator's manual.

Of equal concern are the pilot error mishaps where the aviators' attention to duties is suspect. Their lapses of memory generally result in a traumatic experience. Here are some of this year's pilot error mishaps and fatalities which were the result of collisions with:

Other aircraft—3 fatalities
The ground while landing in formation—3 fatalities
Wires—1 fatality
Trees—1 fatality

In addition to the above fatal mishaps, there was one collision with a fence while landing and two collisions with poles while taxiing and being directed by untrained ground guides.

Army Aviation c nnot continue to accept substandard performance such as that indicated by the foregoing pilot error mishaps. Strong corrective measures must be initiated and employed by supervisors, trainers and operators in order to reverse the direction in which the Army's mishap record is headed.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hot Line, AUTOVON 558-6487 or 205-255-6487 and leave a message

U.S. ARMY SAFETY CENTER

The bark is worse than the bite

During a 33-month period, ending 30 September 1980, Army aviators were involved in 260 reported tree strike mishaps, some of which resulted in injuries and fatalities. Collectively, these mishaps cost more than $6 million for damages to equipment alone. In recent months, the record has improved but slightly. Army aviators are still averaging almost two tree strike mishaps every week.

Logically, you might say that if a tree is big enough to hit, it's big enough to see; and since it is imbedded in the ground, it isn't likely to suddenly move and appear in front of you without warning. While it's hard to argue with this statement, the logic it presents is somewhat akin to that found in an experience involving a foreign visitor to our shores.

Although this individual had mastered basic English, he had not yet familiarized himself with the streets of the city in which he was driving. As he approached an intersection while in the right lane of a 4-lane street, he suddenly realized he should turn left. Without warning, he applied the brakes and cut across the left lane in an attempt to negotiate his turn. He would have made it, too, except for a car that happened to be in the left lane at the time. Since it is somewhat difficult for two bodies to occupy the same space at the same time, a collision resulted.

The visitor promptly jumped out of his car and proceeded to hurl a barrage of accusations at the innocent driver of the second car. When the other driver timidly exclaimed, "But you gave no signal—you didn't stick out your hand," the irate visitor promptly countered, "You can't see big fat car, you gonna see itsy-bitsy hand?"

The fact is a tree can be big and yet not be seen. It gives no warning to signal its presence, and at least figuratively speaking, it can "jump" into your flight path and suddenly appear in front of you. It happened to two pilots who were on a night training mission in a UH-1.

Maintaining the aircraft at an altitude of about 200 feet agl and 60 knots airspeed, the crew identified a road intersection known to be east of the intended LZ, and turned the aircraft to follow the road.

During this portion of the flight, the pilot could not determine the altitude of his aircraft by outside visual references, and, because of the limited natural illumination and light rain, he was having trouble locating the LZ. Consequently, he had his hands full, trying to establish outside visual references while crosschecking his altimeter and other flight instruments to maintain the desired altitude.

The copilot, in turn, was similarly occupied with navigating, dividing his attention between his map and the outside terrain features. Suddenly, without warning, a large tree appeared before them. Both pilots saw it at about the same time, and the PIC immediately raised the nose of the aircraft and increased collective pitch. Simultaneously, the aircraft struck the tree.

Fortunately, the crew was able to return to the airfield and land without further incident. Inspection of the aircraft revealed both chin bubbles shattered, both main rotor blades damaged and extensive damage to the airframe.

To fully appreciate this pilot's dilemma, we need only to project ourselves into his place. What more could we have done? One thing. We could have—and the PIC should have—requested the copilot to help him monitor the altitude. Even then, whether or not this particular mishap would have been prevented is purely a speculative matter.

This example serves a double purpose. First, it points out how existing environmental conditions can greatly increase the pilot's chances of striking a tree, and second, it is important in that it is *not* typical of the tree strikes that occur. While this one happened at night under conditions of poor outside illumination and rain, most tree strikes occur during daylight hours under clear sky conditions, usually while the aircraft is in an NOE hover mode.

It seems difficult to imagine that an aircraft with two experienced pilots aboard will strike a tree during hover in bright daylight. After all, a tree is rooted in the soil. It can't just stretch out and slap an aircraft in the sky. Don't you believe it. It can. As a matter of fact, it did, and it did it under the best conditions that can possibly be imagined. Here's how it happened:

Two of the most experienced IPs were hand picked to pilot a Cobra during the making of a

training film. Both pilots were in good health and well rested. The aircraft similarly was in tip-top condition. As a matter of fact, it was not only mechanically sound but also virtually without a blemish anywhere. By itself, it provided all the motivation needed to ensure the flight would be conducted with the utmost care. It happened to be a general's aircraft borrowed for the occasion.

The route the aircraft was to fly was carefully selected and reconnoitered both from the air and ground. The pilots then inched the Cobra over the intended flight path, making sure all potential hazards were known and could be avoided.

On the day the filming was to take place, weather conditions were ideal. The sky was clear and sunny, and when the camera crews were ready, the Cobra began its flight. All went well until the aircraft was to make a hovering turn and depart from its concealed position. As it made its move, the rotorwash caused the long, limber branches of adjacent trees to flex and flap violently. You guessed it. As the limbs flapped up, the tips went right into the main rotor blades.

What then is the solution? What action can be taken to positively avoid tree strikes? While it may not be practical to do this, one ideal solution would seem to be to strip a tree of its branches, cut it down and move it to some other location. That certainly should eliminate any possibility of a helicopter hitting that specific tree. Right? Wrong! Stripped, cut-down and relocated dead trees are called telephone poles, and in recent months CH-47 aircraft have hit two of them. The cost for these two mishaps exceeded $1.1 million.

By this time you may be developing a trace of paranoia. It seems that no matter what pilots do, "the trees are out to get you." Fortunately, this is not the case.

Accumulated data shows that 83 percent of all tree strikes studied happened primarily as a result of human cause factors. So if tree strikes are to prevented, we must deal with the human element. A necessary action, and a first step, is to create and maintain an awareness of the problem within units. This shouldn't be hard to do. Not when aircraft damage from tree strkes is averaging $180,000 a month or around $2.16 million a year. And when you look at the aircraft involved in most tree strikes, you find additional reasons for an effective unit awareness program.

The most recent statistics show that during a 12-month period (1 July 1980-30 June 1981) 97 tree strikes were reported. Of this number, UH-1 aircraft were involved in 45; AH-1, in 23; OH-58, in 22; UH-60, in 5; and OH-6, in 2. Numerically, the top three contenders for the tree strike "crown" are, in descending order, the UH-1, the AH-1 and the OH-58. This leaves the UH-60 and the OH-6 to occupy the two bottom slots. However, when you examine the tree strike mishap rate per 100,000 flying hours, you get a vastly different and more gloomy picture. The UH-60 now holds the number one spot with a rate of 27.12 tree strikes per 100,000 hours of flight. In second place is the AH-1 with a rate of 25.62. The OH-58, OH-6 and UH-1 then follow in that order.

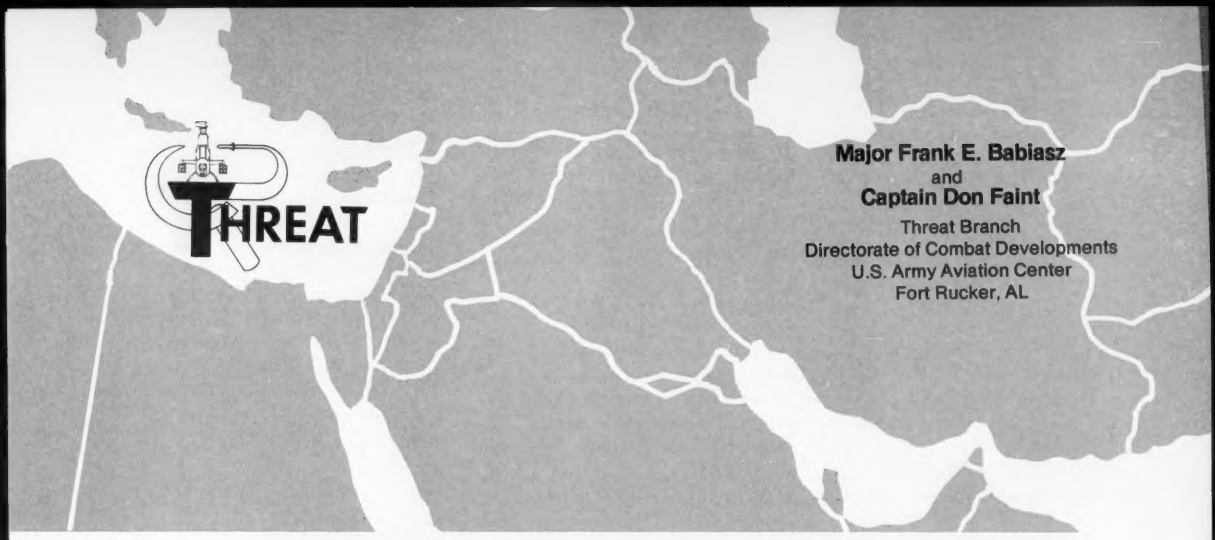
If these rates continue according to the current pattern, the Army is in for some serious trouble as more UH-60s enter the inventory. The cost for a single UH-60 main rotor blade presently is $58,000, and blades for the modernized AH-1S are $19,000 each. Little more needs to be said in argument for the establishment of an effective awareness program.

The second step calls for a close look at your unit SOP. Does it spell out crew duties and responsibilities? Does it include the responsibilities of the pilot not at the controls and those of the pilot at the controls as well as those duties normally assigned the PIC and copilot? SOPs should spell out *all* crew duties in detail. This means the specific duties of other crewmembers relative to flying and nonflying functions should also be addressed. Proper crew coordination during flight is essential to safety.

The third step addresses supervision. Are ARs and SOPs enforced or do they merely serve as something to be displayed only when an IG team happens to be in the area? A tolerant attitude toward tree strikes is of no help in lessening the problem. Further, "supervision" must be cognizant of its own weaknesses. For example, while motivation is desirable, we can overmotivate a pilot into attempting maneuvers beyond his capability, thereby contributing to the problem.

Finally, we come to the individual himself—the pilot. This is the key individual. Has he the experience and skill necessary to accomplish the mission he is assigned? Is he thoroughly knowledgeable about his aircraft, its capabilities and its limitations? Is he aware of his own capabilities? And as far as tree strikes are concerned, does he see them as a threat that can be avoided or does he accept them as being inevitable?

The aviator who views tree strikes as a "fact of life" limits himself to only one line of defense when he comes out second best in an unscheduled bout with a tree. He can but point to the vast expanse of forest in which he has been operating and pitifully exclaim, "But look at all the ones I missed!"



Major Frank E. Babiasz
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MIDDLE EAST WEAPON SYSTEMS – FRIEND OR FOE

IRANIAN attempts to force a halt of oil exports from the Gulf led friendly states to deploy forces to the area.

Major Ken Wiegand, an attack helicopter company commander, had already received his orders. The unit was to attack and destroy an Iranian tank battalion that was rapidly advancing to reinforce existing troop positions along the Gulf of Oman. After proper mission planning, the attack teams dispersed and rapidly moved across the desolate desert sands to intercept and destroy the enemy.

Scout aircraft moved ahead of the attack helicopters. As they neared the suspected location of the enemy forces, flying low and slow, Captain George Price maneuvered his OH-58 Kiowa scout aircraft around a large sand dune to observe the large enemy force, moving rapidly, at a distance of 4 or 5 kilometers. "What a duckshoot," he thought, as he radioed to the attack helicopters to move forward into position. Suddenly, he was surprised by two U.S.-built M113 armored personnel carriers (APCs) moving toward him at a distance of 500 meters. "Probably part of the ground rapid deployment force sent to exploit the successes of the aviation assets," he thought.

Ignoring the APCs, Captain Price looked back once again at the enemy formation when the rounds from the heavy machineguns, mounted on the APCs, pounded the cockpit area. The aircraft pitched forward violently, crashing into sand to become another desert monument. The M113s, part of the reconnaissance element of the enemy main body, maneuvered quickly past the downed aircraft and continued their screening mission.

The previous scenario while fictitious is dramatizing serious problems to prevent a conflict in the Middle East. The reason that target identification of friend or foe is complicated rests with the tremendous variety of weapons systems in the armed services of the Middle East countries. This stems from the changing political affiliations of the Middle East countries and their relationships with the East and West over the past decades. For example, Egypt, having a close association with the Soviets for many years, has its forces equipped with weapons systems primarily found in the East Bloc, even though ties with the Soviets have been severed. Another example is Iran, which possesses many advanced U.S. systems such as the F-14 aircraft and Improved Hawk Air Defense System. Today, Iran is not, by any means, an ally of the United States.

The remainder of this article presents selected Middle East nations and the wide variety of weapons systems in their inventory. Knowledge of their capabilities will greatly assist if the need arises to identify the Mideast "friend or foe."

The equipment matrices that follow in no way are intended as a complete order of battle description, but are presented only for illustrative and/or comparative purposes.

AMERICAN

	tanks		APCs	missiles		antiaircraft	antitank	fixed wing aircraft				helicopters			
	M-48	M-60	M-113	Hawk	Chaparral	Vulcan	TOW	F-4 Phantom	F-5 Freedom Fighter	F-14 Tomcat	F-15 Eagle	F-16 Fighting Falcon	OH-58 Kiowa	UH-1 Huey	AH-1 Cobra	CH-47 Chinook
Egypt								X								
Iran		X	X	X				X	X	X			X	X	X	X
Iraq																
Israel	X	X		X	X	X	X	X			X	X		X	X	
Libya									X							
Saudi Arabia	X		X	X		X			X		X			X		
Syria																

EGYPT

From 1954 until immediately prior to the 1973 Mideast War, Egyptian military supplies were, in the vast majority, of Soviet origin. The military inventory remains largely of Soviet design, but as ties with the West grow stronger and Soviet spare parts become more difficult to obtain, it is highly probable that more armament of Western European and U.S. design will be introduced. The present Egyptian inventory includes a wide variety of East and West Bloc equipment.

IRAN

Under the guiding hand of the Shah, the military arsenal of Iran was built up with some of the most advanced weapons money could buy. Highly sophisticated items such as the F-14 were purchased from the United States, while Chieftain main battle tanks were purchased from Britain, with the basic rifle of German design. APCs include a mixed bag of U.S., British and Soviet equipment integrated into the Army. The Shah, in his drive to obtain the best army in the Middle East, did

SOVIET

	tanks					APCs			missiles					fixed wing aircraft						helicopters				
	T-34	PT-76	T-54/55	T-62	T-72	BTR-40/50/152	OT-62-64	BMP	BRDM-2	SA-2 Guideline	SA-4 Ganef	SA-6 Gainful	SA-9 Gaskin	FROG	SCUD 1-7	ZSU-23-4	ZSU-57-2	MiG-15 Fagot	MiG-17 Fresco	MiG-19 Farmer	MiG-21 Fishbed	MiG-27 FloggerD	Su-20 Fitter	Mi-1 Hare	Mi-4 Hound	Mi-6 Hook	Mi-8 Hip	Mi-24 Hind
Egypt	X	X	X	X		X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	
Iran						X						X	X			X	X	X	X	X				X				
Iraq	X	X	X				X	X							X	X	X	X		X	X	X		X	X		X	
Israel		X	X	X		X	X		X																			
Libya	X	X	X	X	X	X	X	X		X		X	X	X		X	X	X		X	X	X		X	X		X	X
Saudi Arabia																												
Syria	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X		X		X	X		X	X

not limit arms purchases to Western nations only. Numerous items of Soviet design found their way into the inventory.

IRAQ

The Iran-Iraq war to a casual observer could appear a surrogate war between armies equipped by the superpowers. As Western as is the Iranian military, so Eastern is the equipment of Iraq. Iraq has for many years relied on the Soviets for arms supplies. The reliance is clearly demonstrated by the extensive variety of Soviet ground and air equipment.

ISRAEL

Israel has proven to be the mini-superpower of the Middle East and its military capabilities are well respected by countries, "friend and foe" alike. Their repeated success in past, Mideast "come as you are" wars, is a tribute to their determination and military expertise backed by an extensive inventory of equipment. Israeli armament is a mix of Western (predominantly U.S.) hardware, captured armament and arms manufactured in Israel. It must be noted that Israeli armed forces are equipped with many high technology systems provided by the United States.

SAUDI ARABIA

Saudi Arabia's increasing wealth provided the government with the financial resources to modernize the military and public security forces. By early 1976, the capabilities of Saudi Arabia in national defense and internal security had been substantially improved through more than a decade of foreign assistance for training, construction and purchases of arms and equipment. Egypt, France, Pakistan, the United Kingdom and others have provided differing levels of assistance; but Saudi Arabia has depended mostly on its close relationship with the United States in the area of security affairs.

SYRIA

In 1971, Syria continued to be dependent upon foreign sources for new military equipment, as well as for most replacement parts. Since 1956, most equipment has been obtained from the Soviet Union and Eastern European nations; relatively insignificant amounts have been shipped to Syria by the People's Republic of China.

LIBYA

As of 1978, Libya was second only to Ethiopia as the Soviet Union's largest arms customer in Africa. According to a 1977 government research report, "Libyan Armed Forces were the most heavily equipped in North Africa." However, it is interesting to note that some observers stated that large amounts of military equipment are in storage due to a lack of trained operators. (Note: The two Libyan Su-22 aircraft shot down in August 1981 by two U.S. F-14 Tomcats are export versions of the Soviet Su-20 FITTER C.)

BRITISH

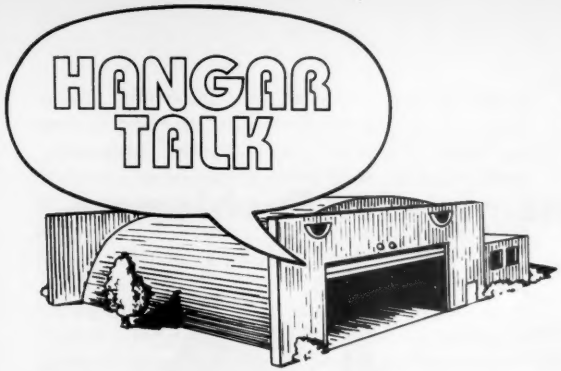
	tanks			APCs		missiles	fixed wing aircraft
	Chieftain	Scorpion	Centurion	Ferret	Fox	Rapier	Hunter Hawk
Egypt							
Iran	X	X		X	X	X	
Iraq			X				X
Israel			X				
Libya							
Saudi Arabia		X		X		X	
Syria							

FRENCH

	tanks	APCs	fixed wing aircraft	helicopters
	AMX-30	AMX-13	Mirage III	Allouette
Egypt			X	
Iran				
Iraq	X			X
Israel			X	X
Libya			X	
Saudi Arabia	X	X		X
Syria	X			

ISRAELI

	tanks	fixed wing aircraft
	Merkava	Kfir
Egypt		
Iran		
Iraq		
Israel	X	X
Libya		
Saudi Arabia		
Svria		



"Hangar Talk" is a quiz containing questions based on publications applicable to Army Aviation. The answers are at the bottom of the page. If you did not do well, perhaps you should get out the publication and look it over.

TC 1-20, Aeromedical Training For Flight Personnel, AND **AR 40-8,** Temporary Flying Restrictions Due to Exogenous Factors

CW2 Gary R. Weiland
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1. Army aviators are restricted from flying duties for how many hours after consuming alcohol?

A. 8 hours if 3 ounces or less of alcohol were consumed
B. 12 hours and until no residual effects remain
C. 24 hours "between bottle and throttle"

2. When are aircrewmembers prohibited from wearing contact lenses?

A. While flying in dusty conditions
B. While flying
C. At any time

3. Aircrewmembers will not be regular blood donors. Following blood donation (200 cc or more), aircrewmembers will be restricted from flying for how many hours?

A. 24
B. 48
C. 72

4. Treatment for heat stroke is to place the patient in cool water and add ice if available.

A. True
B. False

5. A person is *least tolerant* of what type of gravity (G) force?

A. Positive Gs
B. Negative Gs
C. Transverse Gs

6. What type of fire extinguishing agent should *not* be used in Army aircraft due to the extremely toxic nature of its thermal products?

A. Foam
B. Bromotrifluoromethane
C. Carbon tetrachloride

7. Nausea, cool skin, profuse perspiration and rapid pulse are symptoms of what type of heat injury?

A. Cramps
B. Exhaustion
C. Stroke

8. How much more susceptible are blacks than whites to cold injury (e.g., frostbite) under the same environmental conditions?

A. Two times
B. Four times
C. Six times

9. Personnel wearing earplugs during high-continuous noise conditions can hear both direct voice and radio communications better than a person not using earplugs.

A. True
B. False

10. What would be the result, during night formation flights, if aircraft were equipped with twin taillights?

A. Distance estimation and depth perception simplified
B. Susceptibility to autokinesis increased
C. Autokinesis relieved or eliminated
D. A and B above
E. A and C above

ANSWERS

1. B (AR 40-8, para 4a(1))
2. C (AR 40-8, para 5)
3. C (AR 40-8, para 4c)
4. A (TC 1-20, page 6-4)
5. B (TC 1-20, page 4-8)
6. C (TC 1-20, page 5-8)
7. B (TC 1-20, page 6-4)
8. C (TC 1-20, page 6-5)
9. B (TC 1-20, pages 7-4 and 7-9)
10. E (TC 1-20, page 9-11)

NUCLEAR BIOLOGICAL CHEMICAL

Decontamination Problems

This is the second in a series of articles concerning nuclear, biological and chemical problems. The first, "NBC Training and Developments," appeared in the August issue

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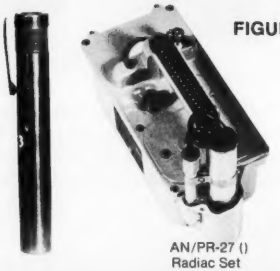
FIGURE 1



IM-93()/UD Dosimeter

AN/PR-27 () Radiac Set

IM-174A/PD Radiacmeter

ARMY AVIATION WILL face some enormous decontamination problems on the integrated battlefield. We need to be aware of those problems and of ways to overcome them.

Nuclear Contamination: This is fallout consisting of residual radioactive particles which settle to the ground after a nuclear burst. Fallout may emit alpha or beta particles, gamma rays or neutrons. This contamination can be easily detected with present equipment[1] (figure 1) and can be removed quickly and easily from aircraft by flying, washing or vacuuming.[2] Decontamination can be verified by the AN/PDR-27 series Radiac Set[3] or the AN/PDR-60 Radiac Set.[4] With present equipment and doctrine capability, the aviation unit should be able to remove fallout from aircraft.

Biological Contamination: This may be fungi, bacteria, virus, etc., and probably would be released as an aerosol or dry powder.[5] Present methods of detecting it require that a sample be taken, then grown for a period of time (usually more than 24 hours) and then identified. This procedure can tell commanders which biological agents were on their aircraft yesterday or last week. Of course, this is too slow a procedure for a tactical unit. Once there is reason to suspect that a unit has been contaminated with biological agents, a commander can direct that the aircraft and equipment be washed and left in the sun. This should neutralize the agent since biological agents may be neutralized by exposure to direct sunlight,[6] hot soapy water with an ionic detergent[7] or many disinfectants.[8] At present there is no method of verifying biological decontamination.

The problems in biological decontamination involve detection and monitoring. Army Aviation needs a portable detection device for biological agents. Currently, a first generation biological agent detection and warning system is being developed for brigade and division tactical operations centers (TOCs). This will be followed by a rapid detection system probably using chemiluminescence which should be able to detect biological agents quickly enough to enable protective measures to be taken before exposure. This same system shows some promise for decontamination monitoring. The biological threat, well documented in open literature,[9] should be incentive enough to prompt the Army Aviation community to lose no

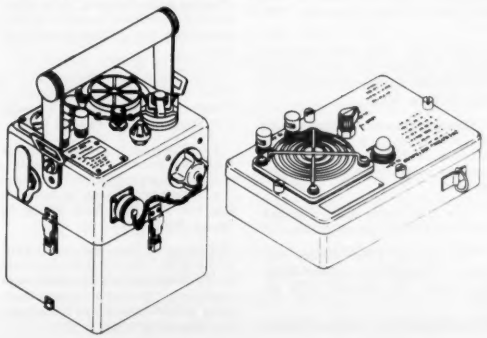
time in demanding that the appropriate biological agent detection devices be fielded as quickly as possible.

Chemical Contamination: This may be liquid, gas or vapor—agents may be nerve, blister, blood, choking or incapacitating—and the threat has been well defined.[10,11] It is the greatest concern for aviation unit commanders because:

- In a tactical situation, chemical agents can immediately affect a unit's mission performance while it takes a longer time (hours or days) for biological agents or fallout to degrade a mission performance.[12,13]
- Threat doctrine expresses a much greater willingness to use chemical agents than nuclear weapons or biological agents. Numerous specific articles in open literature discuss suspected threat use of chemical agents, but there have been few specific references to past threat use of biological agents and none to nuclear warfare. One specific reference to use of biological agents in Campuchea was released as this article went to press.
- Chemical agents pose a unique threat in that they're absorbed into alkyd or acrylic lacquer paint and then gradually seep out of the paint, posing a continuing vapor and contact hazard long after the original contamination.[14] Once the chemical agent has been absorbed into the paint, the paint must be sealed, removed or penetrated by the decontaminant to ensure agent neutralization. The current decontaminants used to do this (STB or DS2) are corrosive to various alloys used in airframe materials.[15]

Aircraft may be contaminated by flying through an agent cloud, stirring up agent contaminated dust or debris, landing on a contaminated area or having contamination fall down from an overhead burst. Gross liquid contamination can be identified quickly with M-8 chemical agent detection paper,[16] and vapor clouds can be detected while inside them with the

FIGURE 2: M8 chemical agent alarm



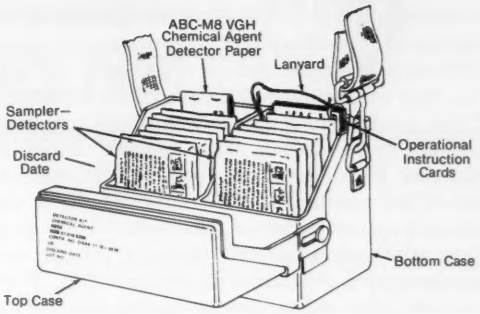


FIGURE 3: M256 chemical agent detector kit

M-8 series chemical agent alarm[17] (figure 2) or the M256 chemical agent detection kit[18] (figure 3). Various decontaminants are available as previously mentioned. Area decontamination can be monitored only with great difficulty, and there is currently no way to verify point decontamination.

Means of Protection: Aviation units in the chemical environment have some special equipment needs. The most urgent is a chemical agent resistant paint for aircraft. A two-component, polyurethane-based paint has been approved which limits the absorption of chemical agent into the paint and greatly eases the removal and neutralization of agent. The aircraft green color of this paint has the same infrared characteristics as the present acrylic lacquer.[19] Hot soapy water will remove chemical agents from polyurethane paint and residue can be collected in an earth sump for later neutralization. Without this chemical agent resistant paint, aircraft decontamination is futile. Also, the Navy is investigating a sacrificial coating which preferentially adsorbs chemical agents and then can be rinsed easily off aircraft.

The next requirement for aviators is a handheld chemical agent monitor with a rapid reaction time. This is necessary to find specific areas of chemical contamination and then later to verify point decontamination. The British have a laboratory model of the chemical agent ion detector that reacts within 10 seconds to most chemical agents.[20] There is not a point chemical agent alarm in our inventory today. Current United States' efforts are directed toward adding a "sniffer hose" to the M43A1 chemical agent detector to allow point monitoring. If approved, the capability may be fielded within 24 months. In addition, an advanced chemical agent detector alarm which uses the same basic ion detection principles as the British detector is being developed.

An adequate decontaminant for aircraft also is needed. The two most promising candidates to replace DS2 and STB are the German C8 emulsion[21] and the U.S. Navy self-limiting aqueous solution of hypochlorite.[22] These decontaminates have been briefly examined and apparently do not cause airframe corrosion. However, C8 emulsion has a possible carcinogen as one of its constitutents, and Navy SLASH is not effective against thickened nerve agent. This equipment will fit into an overall system for aviation unit contamination avoidance/decontamination. Polyurethane paint and the remote sensing alarms have been discussed. The Transportable Helicopter Enclosure (THE) being developed by the U.S. Army Transportation School, Ft. Eustis, VA, will protect parked helicopters from gross liquid contamination. Decontaminants and point decontamination monitoring also have been discussed. Additional equipment being developed includes:

- ISDS (Interior Surface Decontamination System) for aircraft interiors
- ADDCS (Aviation Decontamination Deicing Cleaning System) for aircraft exteriors—and this also provides the aviation unit with a piece of TOE (table of organization and equipment) for deicing and cleaning aircraft
- DAP (Decontamination Apparatus Portable) for aviation ground vehicles and equipment
- LDS (Lightweight Decontamination System) for equipment and personnel decontamination

Once the chemical agent resistant paint, handheld chemical alarm, new decontaminants and developmental equipment are procured, the aviation community will be able to conduct chemical agent decontamination. Until then, we are left with mops, buckets, hot soapy water and the nagging suspicion that the aircraft is not actually decontaminated but just wet and well smeared with agent.

By way of summary, in the area of nuclear decontamination we have some capability for detection, decontamination and monitoring. Biological decontamination has marginal equipment for detection and monitoring but does have adequate equipment for decontamination. Chemical decontamination has marginal equipment for detection and inadequate equipment for decontamination and monitoring.

Based on the threat, the combat, combat support and combat service support missions for aviation, and the current inadequacies in aviation decontamination, it is absolutely imperative that the Army continue to address the NBC decontamination problems faced by Army Aviation.

Summary

Contamination Avoidance/Removal

Preventive Measures
- Polyurethane Paint
- Transportable Helicopter Enclosure (THE)
- Remote Sensing Alarms

Decontamination
- Decontaminants
  - German C-8 Emulsion
  - Navy SLASH
- Equipment
  - Interior Surface Decontamination System (ISDS)
  - Aircraft Decontamination Deicing Cleaning System (ADDCS)
  - Decontamination Apparatus Portable (DAP)
  - Lightweight Decontamination System (LDS)
  - Paint Decontamination Monitor

FOOTNOTES

[1]Field Manual 3-12, "Operational Aspects of Radiological Defense," Department of the Army, Washington, DC, 21 August 1968, pp. 3-1 to 3-7.

[2]Technical Manual 3-220, "Chemical, Biological and Radiological (CBR) Decontamination," Department of the Army, Washington, DC, November 1967, pp. 68-74.

[3]Field Manual 3-12, op. cit., pp. 3-7 to 3-9.

[4]Field Manual 3-15, "Nuclear Accident Contamination Control," Department of the Army, Washington, DC, 28 November 1975, p. 8-1.

[5]Technical Manual 3-216, "Technical Aspects of Biological Defense," Department of the Army, Washington, DC, 12 January 1971, p. 51.

[6]Bernard Davis, Renato Dulbecco, Herman Eisen, Harold Ginsberg, and Barry Wood, *Microbiology* (New York: Harper and Row, 1972), p. 340.

[7]Ibid, pp. 348-349.

[8]Ibid, pp. 344-348, 350-351.

[9]Two articles which discuss the anthrax epidemic at Sverdlovsk in March 1979 are in *Newsweek*, March 31, 1980, pp. 37-38, and *Time*, June 23, 1980, p. 14.

[10]"The U.S. Army NBC Defense Posture, 1978(U)," U.S. Army Nuclear and Chemical Agency, Ft. Belvoir, VA, May 1979, pp. 4-7.

[11]"Chemical Systems Architecture Draft Final Report (U)," U.S. Army Materiel Development and Readiness Command, Alexandria, VA, 6 September 1979, pp. 3-11.

[12]"The U.S. Army NBC Defense Posture, 1978(U)," op. cit., p. 20.

[13]Field Manual 3-22, "Fallout Prediction," Department of the Army, Washington, DC, October 1973, pp. 4-5.

[14]"Investigation of Factors Relative to the Adoption of Two-Component Polyurethane Paint for Army Equipment," DARCOM Polyurethane Task Force, December 1978, Vol. I, pp. 24-25.

[15]Epstein, Furgurson, Fahrenwald, Baker, Ort, Dahlgren, Meyers, "Report of the Ad Hoc Committee on the Interior Surface Decontamination System," Chemical Systems Laboratory, Aberdeen Proving Ground, MD, Table 4 (unpublished).

[16]Technical Manual 3-6665-307-10, "Operator's Manual Detector Kit, Chemical Agent: M256 (NSN 6665-01-016-8399)," Department of the Army, Washington, DC, January 1979, pp. 2-3.

[17]Technical Manual 3-6665-225-12, "Operator's and Organizational Maintenance Manual, Clark, Chemical Agent, Automatic: Portable, Manpack, M8 (NSN 6665-00-935-6955), Fixed Emplacement, M10 (6665-00-169-1446, etc.)," Department of the Army, Washington, DC, 29 August 1975.

[18]Technical Manual 3-6665-307-10, op. cit., pp. 2-2 to 2-6.

[19]Military Specification MIL-C-46168A (MR), "Coating, Aliphatic Polyurethane, Chemical Agent Resistant," Army Materials and Mechanics Research Center, Watertown, MA, 23 August 1978, pp. 3-4.

[20]Information from: Presentation of British Nuclear, Biological, and Chemical Defense Equipment, British Embassy, Washington, DC, 14-15 April 1980.

[21]Fact Sheet No. F-40-79, GE Decontamination Emulsion C-8, Department of the Army USATRADOC Liaison Office, Federal Republic of Germany, Box 115, APO New York 09080, 12 March 1979.

[22]Hoffman, H., Technical Report ASD-TR-79-5020, "Airfield Decontaminant Study (Selection of Decontaminant Chemicals)," Air Force Systems Command, Wright-Patterson Air Force Base, OH, August 1979, p. 11.

Army Aviation Engineering And Flight Testing Program

Major Michael K. Jennings
Aviation Plans/Programs Branch
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THE GROWTH AND development of Army Aviation has opened many doors to the career Army aviator, a few of which are: command opportunity, advanced schooling, and research and development. A doorway into the challenging area of research and development can be entered by a select few as Army test pilots. The Army's Engineering and Flight Testing Program is looking for applicants. For those aviators who qualify for the test pilot program, the reward will be challenging assignments and unique opportunities to perform in the research and development area.

Test Pilot Program Prerequisites. Army aviators in the grade of major and below can apply for the program. While grade criteria may be waived, the following prerequisites are less flexible:

- Must be a rated Army aviator on active duty and in Aviation Service (Specialty Code (SC) 15, 67J, 71 or military occupational specialty (MOS) 100 series).
- Must be rotary wing rated with a minimum of 1,500 hours *military* flying time. A fixed wing rating is desirable. If dual rated, 500 hours must be in rotary wing aircraft.
- The aircraft qualification requirements include—but are not limited to—UH-1 Huey, OH-58 Kiowa and AH-1 Cobra aircraft. Aircraft requirements may be waived; however, the applicant—if selected—may receive additional aircraft qualification training en route to test pilot school training.
- Must possess current instrument rating.
- Must be a competent swimmer.
- Must have completed college algebra, physics and calculus with above average grades. A college degree in engineering is desirable but not required.

Selection and Training. Selection of Army aviators for participation in the program is made by an Officer Personnel Management Directorate (OPMD) board. Representatives of the Aviation Management Branch (OPMD), Warrant Officer Division and U.S. Naval Test Pilot School (USNTPS), as well as the U.S. Army Aviation Engineering Flight Activitiy (USAAEFA) and U.S. Army Aviation Development Test Activity (USAADTA), are included as board members. Only those applications of officers who are recommended by their respective divisions are considered. Once selected and prior to attending NTPS, officers are sent TDY to the Army Test Pilot Orientaton Course at USAAEFA, Edwards Air Force Base, CA. The 60-day orientation course is designed to provide academic and flight refresher training. Academic subjects include college math through calculus, physics, aerodynamics, engineering slide rule and technical report writing. Flight orientation includes high altitude environmental training, flight test techniques and familiarization in a number of aircraft used at USNTPS. USNTPS classes are held twice a year beginning in January and July. The Army's training quota for USNTPS is eight per year (four-January and four-July); however, the number of officers trained is a function of requirements. Upon successful completion of the USNTPS course, graduates are assigned to USAAEFA or USAADTA Ft. Rucker, AL, as engineering test pilots.

Officer Professional Development. Some aviators have been reluctant to participate in the test pilot program for fear that specialization would limit their ultimate professional development. In reality, nothing could be further from the truth. Under the Officer Personnel Management System, test pilots are eligible to fill a wide range of research and development (R&D) requirements. Following initial assignment at USAAEFA, test pilots are geared to the R&D field

and are *not* limited to filling only test pilot positions. Their experience and skills represent a high dollar cost investment and require a closely monitored program of utilization and professional development. R&D test pilots are qualified for and will be assigned to both R&D and aviation (SC 15, 71 or MOS 100 series) positions. Like all OPMD managed officers, commissioned aviators will be managed under the dual specialty concept with school assignments, command opportunity and promotion potential being a function of how well they perform in each specialty. Warrant officer aviators can serve in all aviation positions commensurate with their particular aircraft qualifications.

Additional information concerning the Aviation Engineering and Flight Testing Program can be obtained through contacting the Aviation Management Branch, DAPC-OPA-V, AUTOVON 221-8156/0578; Commercial (202) 325-8156/0578.

Homebase/Advanced Assignment Program

Lieutenant Colonel Richard L. Naughton
Chief, Transportation/Aviation/Maintenance Branch
U.S. Army Military Personnel Center

IF YOU ARE GOING on a dependent-restricted, 12-month tour assignment in the near future this article will be extremely beneficial. If you are a supervisor and have subordinate Soldiers who will be going on a "short tour," read on in order to be able to give the advice that is always requested. Department of the Army (DA) started the Homebase/Advanced Assignment Program (HAAP) to reduce permanent change of station costs and also to reduce turbulence. Those of you who have been on a short tour realize the problems associated with relocating a family and then having to relocate 1 year later. Many readjustments are required especially when school-age children are involved.

Let's take a look at some of the definitions and rules of engagement in regards to HAAP. A homebase assignment means an assignment to a previous continental United States (CONUS)/Hawaii duty location upon completion of a dependent-restricted, 12-month short tour. An advanced assignment means an assignment to a station/location other than the previous CONUS/oversea duty station upon completion of a dependent-restricted, 12-month short tour.

All enlisted Soldiers in grades E5 through E8, regardless of marital status, being assigned to a dependent-restricted, short tour area will be notified of their post short tour assignment (HAAP) prior to departure from their duty station. Soldiers in grades E4 and below, E8 (promotable) and E9 will not be given a homebase/advanced assignment. Soldiers in grade E4, on a promotion list, who are in receipt of assignment instructions and are promoted to grade E5 prior to departure from their duty station will be eligible for and given a homebase/advanced assignment. Soldiers promoted to E5 after arrival in the short tour area do not acquire eligibility for a homebase/advanced assignment. Hawaii residents may be provided a homebase assignment to Hawaii.

Requests for a change of homebase/advanced assignment can be approved by Military Personnel Center (MILPERCEN). Some of the considerations that would be a part of the decisionmaking process are:

- Change in enlisted distribution priorities.
- Projected strength at original and requested locations.
- Professional development considerations.
- Least cost factors (location of dependents).

The needs of the Army may also dictate a change of HAAP and these changes are approved by the Career Division Chief. Soldiers are contacted concerning these changes and offered choices of other locations. A Soldier who extends a foreign tour may or may not be reassigned to the original HAAP location. When no valid requirement exists, the Soldier will be reassigned to another installation with a valid requirement. Soldiers with parachute qualifications will be provided a homebase/advanced assignment to installations authorized parachutists, except when the assignment would exceed the parachute-qualified Soldier requirements at the installation.

Remember, all locations cannot support homebase/advanced assignment requirements since the number of allowable homebase/advanced assignment requirements is based on a percentage of authorizations, and projected more than 12 months in advance.

But, in order to have a better chance to get the assignment of your choice after a short tour, it is important that you keep your DA Form 2635 (Preference Statement) and DA Form 2 current. Assignment managers at Branch use these documents to assist them in determining a post/short tour assignment. Location of dependents and requirements are important factors in the decisionmaking process. While location of dependents is given consideration, Army requirements drive the train. Hopefully this article will give you a better insight for that assignment after the short one.

REPORTING FINAL

Late News From Army Aviation Activities

FROM WASHINGTON

New Scout. The Army awarded a $148,000,000 contract 21 September to Bell Helicopter Textron, Fort Worth, TX, to develop the new near-term scout helicopter, a modified day/night scout helicopter capable of operation worldwide. This is part of the Army Helicopter Improvement Program (AHIP) which provides for modification of existing Army observation helicopters.

(SAPA PI)

FROM ST. LOUIS

Welcome the APACHE! The Army's newest aircraft, the AH-64A advanced attack helicopter, has been named APACHE after the American Indian Tribe.

War was a way of life for the Apache tribe which lived in Arizona and New Mexico. The Apaches traveled in small bands or clans that could easily hide in the mountains and canyons. Fighters to the last, they were masters of combat and concealment.

The name APACHE has been approved as the popular name for the AH-64 because the helicopter has much in common with the Indian tribe. It, too, will travel in small bands or singly in order to remain concealed within the forward battle area. The APACHE—the most advanced helicopter tank-killer in the world—embodies the famous fighting spirit of its ancestral namesake. Because of ballistics, toughness, ease of maintenance and rugged construction, the APACHE will live on the battlefield with the combined arms team, immediately available to fight when and where needed. **(AAH PM)**

The AH-64A APACHE

Program Cost Reduced. A modification in the AH-1S Modernized Cobra's control system has been accomplished by Army Troop Support and Aviation Materiel Readiness Command personnel at Corpus Christi Army Depot, TX, at about one-third the cost proposed by the commercial contractors.

Based on a request from the Army Aviation Center, Ft. Rucker, AL, the modification will result in 23 Modernized Cobras having hydraulically boosted controls which will allow equal control authority for both pilots in the aircraft.

During flight training, the student pilot normally is in the rear cockpit of the tandem-seating helicopter. That position has full-sized flight controls, while the front cockpit has a set of miniature controls. The control differential introduces an imbalance between the student and instructor, making it difficult for the instructor to override the student in emergency situations. The modification will correct that imbalance.

(TSARCOM PAO)

FROM MARYLAND

New ARNG Training Site. The Army National Guard Aviation Training Site (AATS) for units in the eastern United States began limited operations in September. It is located at Ft. Indiantown Gap, PA, and is commanded by Colonel Bill Badger, former operations branch chief for the National Guard Bureau Aviation Division, Aberdeen Proving Ground. The Eastern AATS is expected to be in full operation by fiscal year 1983.

A Western AATS, to be located in Arizona, is programed to open in FY 1985.

The AATS, in cooperation with the Directorate of Evaluation and Standardization, Army Aviation

Center, Ft. Rucker, AL, will conduct standardized individual aviator training for Guard members, using ARNG aircraft. This will not duplicate nor compete with the USAAVNC's formal training programs. **(NGB AVN DIV)**

FROM FT. RUCKER

Correspondence Course Updates.

• *MOS 93H (Tower Operator) and 93J (Radar Operator).* Eligibility requirements for enrollment in correspondence courses for MOS 93H and J, skill levels (SL) 2 and 3, have been changed.

Present requirements limit enrollment in the Air Operations Primary (SL 2) and Basic (SL 3) Technical Courses (PTC/BTC) to Soldiers who possess the specific MOS and skill level. To aid field commanders/trainers in the cross-training required for MOS 93H and J, the eligibility for enrollment has been broadened so that individuals completing the PTC or BTC for their MOS may enroll in the other. For example, a 93H1 or 93H2 who completes the MOS 93H PTC may then enroll in the MOS 93J PTC.

The affected courses are: Air Operations Primary Technical Course—SL 2, MOS 93H, Course Number (CN) R-14, and MOS 93J, CN R-34; Air Operations Basic Technical Course—SL 3, MOS 93H, CN R-17, and MOS 93J, CN R-37.

• *MOS 71P Flight Operations Coordinator.* One promotion point is awarded Soldiers in grades E-1 through E-5 for each five credit hours completed in the Army Correspondence Course Program (ACCP).

There are five correspondence courses which train in critical tasks for each skill level of MOS 71P: Flight Operations Coordinator Course, CN 151, SL 1; Air Operations NCO Senior Course, CN T-01, SL 5.

Soldiers interested in furthering their career through the ACCP should check with their training NCO or local education center. Course contents are listed in the Army Aviation Correspondence Course Catalog (DA Pam 351-20-3). To apply for enrollment, complete a DA Form 145 and forward to the Army Institute for Professional Development, Army Training Support Center, Newport News, VA 23628. For further information, contact the ACCP Liaison Officer, P.O. Box J, Ft. Rucker, AL 36362 (AUTOVON 558-3703/3668).

(USAAVNC DTD)

ATC Assistance. Military air traffic controllers assigned to the Army Communications Command-Ft. Rucker have been dispatched to various airports to augment Federal Aviation Administration air traffic control facilities as a result of the job action by the Professional Air Traffic Controllers Organization.

As many as 69 of the highly qualified ATC personnel from USACC-Ft. Rucker have been sent to Atlanta, GA; Cleveland, OH; Pittsburgh, PA; Kansas City and St. Louis, MO; Memphis, TN; Houston, TX; Burlington, VT; and Baton Rouge, LA. Others are on standby to be dispatched as needed.

Officials have said that the temporary loss of these controllers from Ft. Rucker will not adversely affect the aviation training program.

The one major change imposed is that most instrument training flights are now being scheduled within the installation's airspace. This has curtailed the number of aircraft that can be handled, so an additional flight period has been added to the training day's schedule to ensure students will not be held back on this vital portion of their course.

November's *Aviation Digest* will carry information on the overall support given by Army controllers to FAA ATC facilities.

Graduation Speaker. Major General Robert M. Elton told members of three graduating aviator classes that increased dialogue about aviation issues among the Army leadership reflects renewed concern over Army Aviation's role in the future.

General Elton, who commanded the Army Military Personnel Center, Alexandria, VA, when he made the July speech and who is now commanding general of the 9th Infantry Division and Ft. Lewis, WA, said one result of that concern has been the recognition of Army Aviation as a combat arms element.

West Pointers Graduate. Diplomas have been awarded to 51 U.S. Military Academy cadets for completing a 3-week TH-55 helicopter orientation flight training program.

The 50 men and one woman, who are members of the West Point Class of 1983, received 15 hours of instruction, including a solo flight. They were also familiarized with the night vision goggles, nap-of-the-earth flight and flight simulators.

Those selected for this course volunteered for it and had to pass the Flight Aptitude Selection Test (FAST) and a flight physical examination. They had the highest FAST scores of the approximately 500 West Pointers who took the test. **(USAAVNC PAO)**

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Pam McLemore Photo by Tom Greene

Water Purification Tablets

We have recently been contacted by individuals in the field with regard to the serviceability of the water purification tablets, national stock number (NSN) 6850-00-985-7166, which are contained in Army aircraft survival kits. Inspecting personnel have found some of the tablets to be discolored and have been in doubt as to whether or not these tablets are still useable. To find out for sure, we contacted the medical experts at the U.S. Army Medical Materiel Agency, Ft. Detrick, MD. We were informed that if the tablets are light grey in color, they are probably all right; however, if the tablets are powdered or discolored to shades of brown, they are no good and should be replaced. Incidentally, we also contacted the item manager of the water purification tablets in the Directorate for Medical Materiel at the Defense Personnel Support Center, Philadelphia, who assured us that adequate supplies of these items are available for replacement issue. For further information, point of contact (POC) at this office is Mr. Ed Daughety, AUTOVON 693-3307, or Commercial (314) 263-3307.

Felt Liner For Mukluk

Many of you located in the colder climes (Zones V-VII) have been asking us how to get the heavy felt liner for the boot, extreme cold weather, mukluk, which is authorized by CTA 50-900 under LIN C08274. Although the mukluk has been readily available, it seems that the felt liner, which is essential for the functional performance of the boot, was never adopted for Army use. Well, friends, despair not! The Army has now been identified as a user of the sock, extreme cold weather, and the item is being listed in Army catalogs and added to the Army Master Data File (AMDF). It is available from S9T at a cost of $6.50 per pair under NSNs 8415-00-177-7992, -7993, -7994 and -01-3503.

Modification Of Nomex Jackets

The Air Force has informed us of a potential problem with the CWU-36/P (NSNs 8415-01-010-1912, -1911, -1910 and -1913) and CWU-45/P (NSNs 8415-00-310-1111, -1126, -1133 and -1140) Nomex flight jackets. Reports have indicated that the pleated area on the back of these jackets often catches on hatches and other equipment in aircraft cockpits. This hazard has been recognized and corrective action has been initiated. The Air Force has authorized a modification to remove the pleated area. Technical order (TO) authorization and instructions were published to this effect on 25 August 1981 in the form of an Operational Supplement No. 3 to TO 14P3-1-112.

Articles from the *Aviation Digest* requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, *U.S. Army Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362

If any Army personnel having either or both of these jackets have experienced similar problems, they should take measures to make the modification approved by the Air Force.

Proper Wear Of The GS/FRP-2 (Again)

Questions have recently arisen again pertaining to the proper way to wear the GS/FRP-2 Nomex flying gloves. Since nothing has changed since the last time we published information regarding this, we furnish the same information to you again.

Do you know the proper way to wear your GS/FRP-2? Do you know what your GS/FRP-2 is? In case you aren't aware of it, that is the correct designation for your Nomex flight gloves. Apparently a recent article in FLIGHTFAX (Vol. 8, No. 20, 5 March 1980) regarding the proper wearing of the gloves, i.e., inside the flight suit sleeve, has sparked quite a controversy, since most aviators have been taught to wear the gloves on the outside of the sleeve. To resolve the question, we queried the U.S. Army Aeromedical Research Laboratory at Ft. Rucker, AL, and were informed that there is, in fact, no standard policy for the wearing of Nomex gloves. The important thing is that there is a "fire tight" seal between the sleeves of the Nomex flight suit and the gloves. This can be achieved by placing the gloves under the sleeves or over the sleeves with equal results. No other specified policy has been established . . . . (Reprinted from PEARL, July 1980) However, the Army Safety Center strongly recommends the gloves be worn under the sleeves to prevent them from catching on aircraft controls.

Questions And Answers

Apparently there are several one-person liferafts available for use in our survival kits. Which is the correct one for use in the OV-1 (RSSK) overwater survival kit? (Lynn Holder, AASF #2, GAARNG, Dobbins AFB, GA)

TM 55-1680-317-23&P indicates the LR-1 raft (NSN 4220-00-118-6122) as the correct raft for the OV-1 (RSSK) overwater survival kit; however, any of the one-person rafts listed in Chapter 4 of TM 5-4220-202-14/TO 14S-1-102 may be used in lieu of the Navy LR-1 raft. The LRU-3/P raft (NSN 4220-00-726-0424) is the most widely used raft in the Army Aviation inventory. The LRU-4/P and LRU-16/P rafts (NSNs 4220-00-132-4230 and 4220-01-003-6763LS, respectively) are in the process of being adopted for Army use. TM 55-1680-317-23&P is being revised to reflect the above information. POC for further information is Mr. James Dittmer, TSARCOM Directorate for Maintenance, AUTOVON 693-3715 or Commercial (314) 263-3715.

How Can I Get The

The *U.S. Army Aviation Digest* is an official Department of the Army publication.

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Brigadier General Ellis D. Parker
Deputy Director of Requirements
and Army Aviation Officer
Office of the Deputy for Operations
Headquarters, Department of the Army

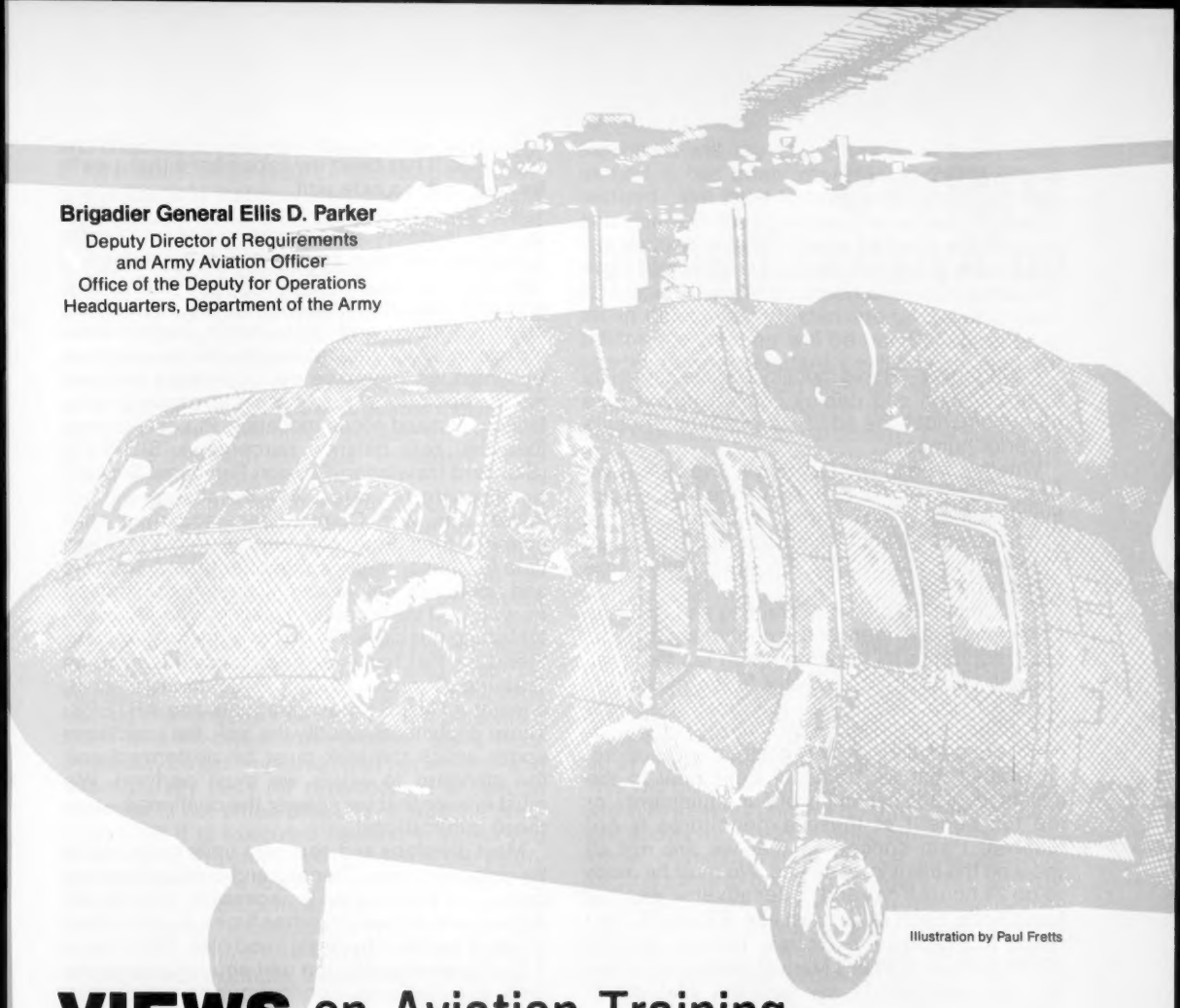

Illustration by Paul Fretts

VIEWS on Aviation Training

THE ARMY IS currently spending a large portion of its budget on Army Aviation. These expenditures are justified because the sophisticated aircraft and associated systems provide commanders with the largest and most flexible multiplier of combat power they have ever enjoyed.

It is interesting to look at this multiplier in terms of the Principles of War, and to note how they apply in view of Army Aviation:

• *The Principle of Mass*—Provides the commander with the ability to achieve superiority in combat power at the desired place and time. This can be accomplished through the rapid deployment of attack helicopters, movement of artillery and troops, and resupply of combat units.

• *Economy of Force*—Army Aviation provides the commander with organic mobile firepower and the means to shift combat units. This capability allows him to allocate, to his secondary effort, the minimum essential combat power. He can then concentrate his major effort elsewhere on the battlefield.

• *Surprise*—The mobility inherent in Army Aviation provides the commander with the luxury of rapidly shifting and exploiting his combat power before the enemy can effectively react.

• *Security*—Through scout observation and electronic surveillance, the commander has the means to prevent the enemy from acquiring an unpredicted advantage.

VIEWS on Aviation Training

• *Maneuver*—Rapid mobility and the capability to preposition and deploy combat power give the commander the ability to overcome hostile superior numbers.

Whether it be in *The Objective, The Offensive, Unity of Command* or *Simplicity*—the four remaining principles of war—Army Aviation gives the commander a distinct advantage, again because of its unique adaptability, maneuverability, firepower and speed.

The United States Army Training and Doctrine Command has written, and is continuing to write, user requirements for aircraft that tax the engineering capability of industry to the maximum. We are flying aircraft with the most up-to-date technology and design capabilities. Such equipment is understandably very costly. It is, therefore, imperative that we train our personnel to the design level and capability of our equipment—or the full benefit of these expenditures is not realized. I am concerned that we are not all meeting the training challenge. We must be ready to go 24 hours a day and under adverse weather conditions. Each of us must ask ourselves, am I ready to execute the Aircrew Training Manual (ATM) tasks or Soldier's Manual tasks appropriate for my position? Is my section, platoon or organization prepared, at this moment, to execute all assigned tasks (Army Training and Evaluation Program (ARTEP) and operation order)? If the answer is "no" or "I am not sure," then we have not "measured up."

There are many reasons why we fail to train to the design specifications of our equipment. "Training distractors" degrade our effort. Some distractors are real while others are perceived. Sometimes inadequate fuel and ammunition allocations are obstacles to meeting the training challenge. Remember, you are the expert on resource requirements. If your allocation is insufficient as an aviator or as a leader, challenge the allocations. Training area availability and distance to training areas generally detract from unit training. Fight to get your training area! A unit always tries to avoid the risk of bad performance indicators, such as an accident or an incident. However, it has been my experience that a well-trained unit is a safe unit.

We, the operators and trainers, have not done as well in developing performance or "health indicators" as have our counterpart administrators and logisticians. Each division's G-1, G-2 and G-4 has developed, over the years, very clearly defined and measurable performance indicators. Such indicators provide the standard by which we "measure up"! Examples of these are the operational readiness rate, demand satisfaction, demand accommodation, PLL (prescribed load list) zero balance percentage, SIDPERS (Standard Installation/Division Personnel System) timeliness/error rates, AWOL (absent without leave) rate, etc. Commanders and their staff channel their time and energy into providing data for these "measurable quantities." Trainers and operators, unfortunately, have not quantified as well, and we sometimes have difficulty in establishing our case. We do have the best training literature that has ever been available, such as Training Circular 21-5-7, Field Manual 21-6, current ATMs, Soldier's Manuals and ARTEPS. These documents identify the task, the conditions under which the task must be performed and the standard to which we must perform. We must ensure that we answer the challenge—use these publications!

Most divisions and separate units have yearly training calendars. Changes and fluctuations may occur, but a basic plan is necessary. This can be moved and slipped to other times, but we must "make it happen" by design and plan. Don't leave it to chance! An aviation unit should train in the field, as a minimum, 7 continuous days a quarter. Training should be conducted and supervised in an environment that permits junior leaders and commanders to make mistakes—and to learn from those experiences. They must understand that mistakes will be tolerated and that teamwork and excellence will receive positive reinforcement. The training accomplishments in our training exercises must be captured and objectively and introspectively critiqued by the participants. Each hour of training in the field should be well planned—and checked. Schedules may be modified, changed or left unchanged, but all aspects of the individual Soldier, team, section and unit's training must be in this hourly plan. For example, is the wheeled vehicle section scheduled to pull a service on one of its trucks in the field? How does the operations section intend to keep track of crew rest, and how does it intend to service their generator? All these areas must be planned

and checked in your plan of execution. Individual Soldier skills can be taught in garrison. However, it is in the field that they are honed and brought together as a training package. Don't forget that the noncommissioned officer (NCO) must be brought into the training planning cycle early-on to ensure that each section, team and platoon's training is comprehensive and complete. How many times have you seen Soldiers erect a GP medium tent in the field? How many actually knew what they were doing? In most cases, a good NCO and one or two knowledgeable individuals carry the group. We must structure our training to ensure that each individual "measures up" to the numerous tasks of a Soldier.

In addition, it is imperative that a unit take all of its equipment when it goes to the field. This includes the test set that has been plugged into the hangar wall socket—as well as the oft neglected generator that is designed to provide power. To get all of this equipment to the field, the unit must develop standardized loading plans. Procedures to complete tasks also must be standardized. Such standardization minimizes training challenges as we receive new personnel. Even in a no-threat environment, tasks must eventually be accomplished with perfection—and this naturally calls for repetition. If a platoon insertion is not timed properly, it must be practiced until it is executed flawlessly. When you finally reach the unit training phase of the yearly training plan, you must go back and check to ensure that all sections are not only functioning in the desired, standardized manner, but that they are planning ahead for future, more difficult missions. For example, look at the POL section. It is probably the busiest and most proficient section in the unit. What should you check? Check its plan for the quantity of fuel it intends to use for this problem. What is its plan for moving to the next location, and how does it intend to maintain a continuous operation while moving? The section NCO should have developed standardized procedures and plans for these functions.

In summary, as aviation leaders our objective is to attain and maintain combat readiness. Our objective is training so detailed that every training hour will provide the Soldier with the necessary knowledge and experience to "do it right the first time." We must not assume that any one aspect of our training or operation is ready. Planning, executing and testing are our only assurance. Training plans should be innovative and in sufficient detail to ensure that each individual will say that "they have been challenged, it has been interesting and they have learned." We must focus on important training and eliminate the countless distractors. Challenging training is the pathway to good morale and esprit. We must: (1) determine training objectives, (2) identify tasks to be accomplished in achieving those objectives, (3) stipulate under what conditions the training will be conducted, and (4) specify to what standard it will be achieved. All members of the team must be informed of the training objectives and the required criteria so they can intelligently participate. The standards must be tough and related to combat. Fundamental skills and small unit training are the keys to success and must be stressed continuously. We must standardize to such a degree that the differences from one crew or team to another are not discernable. Wars are won by tough, well-trained individuals, crews, sections and platoons.

With such a system, the unit will have a good training plan and time allocated to execute that plan. The soundness of the plan will have been checked—with the NCO brought into the planning cycle early-on. The NCO will know what he has to do in order to train his Soldiers and his section. This will give the commander a firm base upon which to train his unit in a no-threat environment that allows for mistakes while striving for excellence. Standardization will be stressed from loading plans to operations orders. The unit will be able to train safely and to the capabilities and design characteristics of our modern aviation systems. Finally, the unit will be combat ready for any no-notice situation and will be fully capable of applying the combat multipliers afforded by Army Aviation.

BG Ellis D. Parker

Specialist Five Jim Davis
United States Forces Korea
Eighth United States Army

DUSTOFF KOREA

MEDICAL EVACUATION in Korea is as close to combat as you can get without the bullets," Captain Roger M. Opio noted, adding, ". . . sometimes, we even get those."

Captain Opio should know. As operations officer for the 377th Medical Company (Air Ambulance) commanded by Major Ronald L. Woodward, the 6-year Army Aviation veteran is involved one way or another in almost all aspects of "Dustoff" in the Republic of Korea (ROK). Despite the special hazards of flying medical evacuation in a country whose war with neighboring North Korea has never officially ended, Captain Opio characterizes Dustoff Korea as the "most challenging assignment there is."

For the 128 members of the 377th, part of that challenge stems from the company's fourfold mission and part from Korea's more than 33,000 square miles of formidable terrain.

"Our first and most important job," explained Captain Opio, "is providing aerial medical coverage to American forces throughout the Republic. Our next area of responsibility is the transportation of medical equipment, supplies, personnel and biologicals such as blood to wherever they're needed. Also, we transport all Status of Forces Agreement (SOFA) cases and any others authorized by the United Nations Command. Finally, the 377th is responsible for the operation of the H201 VIP Heliport at Yongsan Army Garrison in Seoul."

Fulfilling these job requirements resulted in more than 4,664 hours of flying time and 1,836 missions in fiscal year 1980, a record which compliments both the aviators and the maintenance personnel.

But accomplishing these varied missions is made no easier by Korea's unique topography and climate. "The mountains of Washington to the plains of Kansas are just a 5-minute flight in the Republic," acknowledged Captain Opio, "and an aviator here has to be well-qualified at mountain flying and terrain navigation because we've plenty of it all."

With four distinct and often extreme seasons, Korea's weather provides a further test for the Soldiers and aircraft of the 377th. "Every conceivable characteristic of an aircraft comes into play here sooner or later," the operations officer said. "Between the bitter cold of winter, the rainy season and the heat of summer, our aircraft and people run the entire spectrum of possible weather conditions."

But perhaps the deadliest challenge facing Dustoff Korea, and all other aviators who traverse Korean skies, is military. Since the signing of the Korean Armistice Agreement in 1953, nine United States and ROK aircraft have been shot down by the North Koreans, resulting in the deaths of four Amer-

icans and three South Koreans. As recently as December 1979, a Dustoff Korea helicopter was fired on by the North while evacuating American casualties from the demilitarized zone (DMZ)—a mission which earned the pilot a Meritorious Service Medal.

Meeting these and other challenges while facing an inherent problem of "the few doing much for the many" requires support and organizational ties to other units. Operating as an element of the U.S. Army Medical Command Korea, the 377th relies on Eighth U.S. Army aviation units, primarily the 17th Aviation Group (Combat), for technical guidance, advice and assistance. The 377th itself is composed of six distinct sections: company headquarters, flight operations, a service platoon and three air ambulance platoons.

Located in Seoul, the headquarters section provides the administrative support for the unit while flight operations, considered the hub of the company, controls all the 377th's assets.

Operations also has the responsibility of operating the Yongsan VIP Heliport providing support for the United Nations Command Commander in Chief, his staff, and other United States and Allied dignitaries.

About 15 miles southeast of Yongsan at K-16 Seoul Army Airbase, the service platoon is responsible for ensuring the airworthiness of Dustoff Korea's 18 UH-1 Huey helicopters. All major repair and maintenance work on the Dustoff aircraft is done there.

The 377th's three air ambulance platoons—better known as Dustoff North, Dustoff Central and Dustoff South—are situated at field sites central to their respective segments of the country in a deployment designed to minimize reaction time to a crisis.

Dustoff North, working in conjunction with the 2d Infantry Division's 2d Medical Battalion from a field site 30 miles north of Seoul, is responsible for any missions arising between the DMZ and Seoul. The site is staffed on a rotating basis. One crew—pilot, copilot, crewchief and medic—works Monday to Friday and is replaced by another which spends the weekend on call. Monday, the process is repeated.

It's at Dustoff North where the most demands are made. These are the people responsible for medical evacuation out of the DMZ, as well as for providing routine coverage every time a unit goes to the field or to a range. While on site, the crew is on a 24-hour alert with an allowable reaction time of only 10 minutes.

The pilots of Dustoff North are a select group—each one must qualify and remain qualified to fly in the northern tactical zones, the DMZ buffer zone (BZ) and the Joint Security Area (JSA) at Panmunjom. In these areas aviation errors can have far-reaching consequences. "A small mistake in the buffer zone, even an error of 100 meters, and you don't just have a slip-up, you've got an international incident," Captain Opio said. "And if you do make that error, the people on the other side of that line are going to be trying very hard to shoot you down."

To avoid mistakes of that type, the Dustoff North pilots continually train, flying over and over the same areas to ensure familiarity. The crewchiefs meticulously inspect and reinspect not only their own aircraft but the spare one Dustoff North keeps on hand to guarantee mission readiness. The 377th medics, nearly all of whom boast both the Expert Field Medical Badge and the Emergency Medical Technician patch, not only work to update their own proficiency but also train ground forces on how to request and prepare for a Dustoff evacuation.

All of this is in addition to their real purpose to be there, ready and able to respond to a mission. Whatever the crews may be doing—training, eating or sleeping—a mission preempts all else.

When a mission comes in, things happen with amazing speed. While the 2d Medical Battalion duty of-

A Dustoff medical evacuation team helicopter waits on a mountaintop helipad. The combination of well-trained pilots and medical experts gives the Eighth U.S. Army a highly professional emergency medical service in Korea

photograph by SP5 Jim Davis

ficer briefs the pilot on the nature of the mission—whether routine, priority or urgent—the copilot and crewchief are already in the aircraft preparing for takeoff. By the time the pilot has finished his briefing and received a weather report, the medic has selected his equipment and boarded the aircraft.

If the pilot decides the mission is a "go" (and only the severest of weather cancels a Dustoff mission), he rejoins his crew and the mission is airborne. Dustoff crews rarely take more than 6 minutes from notification to takeoff.

Further south, the missions are similar but somewhat less intense due to the greater distance from the DMZ, according to Captain Opio.

The second platoon, Dustoff Central, operates out of Osan Air Base 45 miles south of Seoul. Like Dustoff North, Dustoff Central is manned on a rotational basis with crews being flown in from Yongsan on a Monday to Friday, Friday to Monday schedule. Their area of responsibility covers the central area of the Republic from Seoul south to Taegu.

From Taegu southward all the way to Cheju Island, aeromedical coverage belongs to Dustoff South, a permanently assigned platoon stationed in Taegu. And while the pilots of Dustoffs Central and South aren't required to maintain the JSA, BZ and tactical zone qualifications of their Dustoff North colleagues, they are required to qualify in area familiarization and restricted zone familiarization in their own sectors of responsibility.

Wherever they are assigned, the members of the 377th agree Dustoff Korea is unlike anywhere else. "Just pull out your aviation books and take a look through them; because sooner or later during your tour here, you are going to encounter every situation you've ever read about," advised Chief Warrant Officer, CW2, Thaddeus J. Davis III, a Dustoff North pilot.

Despite the challenges, and maybe because of them, few people associated with Dustoff Korea would trade jobs with anyone. "Every time we get a mission, I feel as if I've had a shot of adrenalin," Chief Warrant Officer, CW2, Bruce Trescott said, "because I know it is for real here and we're really on the line. Knowing that and knowing the status of the patients depends on your ability to pick them up and get them to the help they need . . . that's good, real good!"

Specialist Five Davis E. Gaines, Dustoff medic, declared, "Let me put it like this: I just reenlisted so I can spend another year with Dustoff Korea because *here* is what it's all about."

Each casualty is a "personal concern" of the Dustoff medical evacuation teams. In this sequence team experts (1) gather vital data prior to evacuation; (2) determine en route care; (3) with speed and care load the casualty; (4) tend to patient en route—here monitoring pulse

photographs by SP5 Jim Davis

U.S. Army Communications Command
ATC ACTION LINE

ATC System Limitation Awareness (Or Lack Of It)

ALTHOUGH AVIATORS may debate pro and con over the see-and-avoid concept as being a DC-3 procedure used in a jet age environment, any withdrawal of radar monitoring, either known or unknown to the flight crew, represents a serious operational limitation of the air traffic control (ATC) collision avoidance system. When withdrawal is known, the collision avoidance system is limited to the versatility of the crew in head swiveling. When withdrawal of radar service is unknown, it can be catastrophic.

The following is a typical air carrier crew report to the Aviation Safety Reporting System (ASRS):

"We had a near midair climbing out of XYZ airport. We were on a radar vector in the TCA, just turning to 090 degrees heading and leaving 9,500 feet. Just as I leveled the wings, the flight engineer called out traffic at twelve o'clock! I had to push the yoke forward to miss a small red and white aircraft. We passed underneath him by approximately 200 feet. When we advised the controller that we almost hit a small aircraft, he said, 'Now I see him. Six o'clock and a mile.' Why is it always six o'clock with the close ones?"

On the surface, and as it obviously appeared to the reporting pilot, this narrative would seem to indicate a radar controller's failure to detect a target which almost resulted in a midair collision. No traffic advisories on a converging aircraft had been transmitted; therefore, the controller had failed to do his job properly. *However,* an indepth analysis reveals other secondary causal factors associated with the incident. Reading between the lines, it becomes evident that what was *not* said in the above narrative is that pilot assumptions and expectations led the flight crew "down the garden path" of mistaken anticipation.

Two cockpit assumptions are apparent: First, the crew assumed the air carrier was operating in the neat, tight radar security of the terminal control area (TCA) airspace and second, ATC radar has the capability of "painting" all aircraft targets in the air carrier's flight path. These assumptions would lead logically to the expectation of all pertinent traffic advisories. How this expectation affected outside-the-cockpit scanning in this incident can only be surmised.

A quick look at the chart confirms the ceiling of the TCA at XYZ airport, in the airspace where the incident took place, to be 7,000 feet. The airliner, out of 9,500 feet, had not only exited the terminal airspace but was penetrating the congested TCA boundary altitudes used frequently—and legally—by nontransponder equipped, light aircraft skirting the control zone.

Aviators must recognize that light aircraft without transponders:

- Frequently will not produce a primary radar return (skin paint) on the controller's scope.
- If not under air traffic control, the controller has no knowledge of that traffic and cannot issue advisories relative to it.

Studies of midair conflicts reported to ASRS at specific airports show that most encounters with visual flight rules (VFR) traffic that occur just outside the TCA airspace boundaries are not pointed out by radar controllers. They may be occupied with higher priority duties which prevent issuance of advisory messages concerning aircraft not normally participating in the ATC system. Furthermore, if the VFR aircraft are not equipped with altitude reporting transponders, the controllers would be calling out numerous targets that might be at altitudes far removed from the IFR (instrument flight rules) aircraft's flight path.

In the final analysis, unwarranted expectations of radar controller intervention by aircrews and their lack of exact knowledge of ATC system limitations can become decisive factors in contributing to a midair conflict.

The best hedge against these limitations is the same advice given to Pilatre de Rozier by his wife on 15 October 1783 when he, in his tethered balloon, became the world's first aeronaut—*Watch Out For The Other Birds!*

Readers are encouraged to address matters concerning air traffic control to:
Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22314

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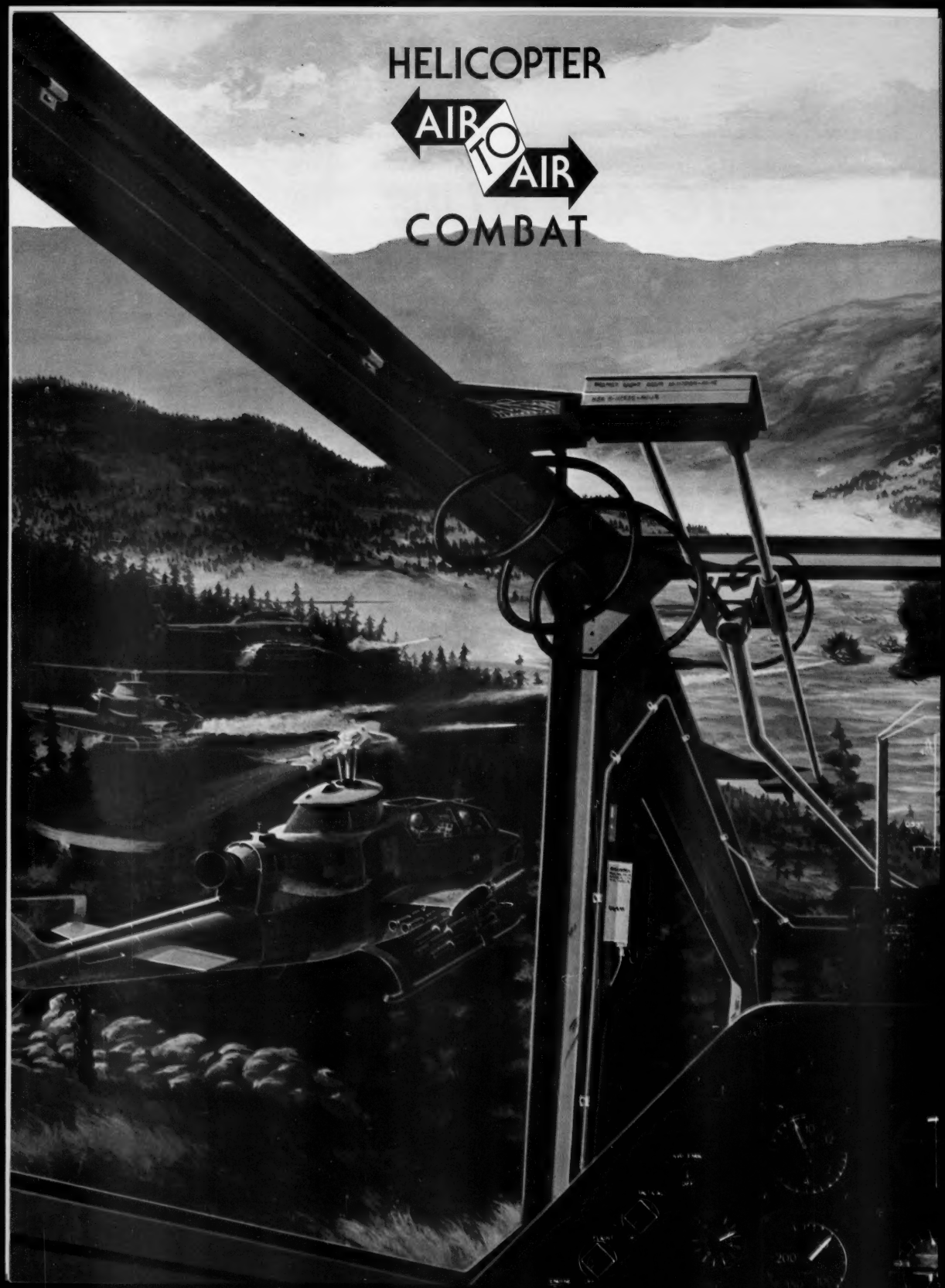
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